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Contents

This week...

08 Get More From Windows 7

If Microsoft had its way, the whole world would be using Windows 10 by now. The reality, however, is that it's still not the most popular version of its operating system, even though it was given away for free. No, that honour still goes to Windows 7, and that's why we've put together this guide, looking at how you can make your Windows 7 build last for as long as possible

18 Fallout 4 And Pornhub

There's no doubt that Fallout 4 is one of the most hotly anticipated games of this year, with its release due in just a few months. At the moment, though, there have been precious few details revealed about it, so when gameplay footage was leaked, it was big news and demand was high. The problem for gamers was that the video was quickly pulled from almost every site hosting it, except, oddly enough, a pornography provider. Sarah Dobbs looks at what went on

22 Is Hacking Getting Worse?

The recent hacking of the adultery/dating service Ashley Madison was simply the latest, high profile example of a long line of similar cases in recent years. But is it also a sign that things are getting worse? Are there really more hacking incidents than there used to be? We sent Mark Oakley looking for answers

46 4K Monitors On Test

58 DRM-free Content

46 4K Monitors On Test

It doesn't seem that long ago that everyone was getting excited about 1080p, but these days the buzz word on everyone's lips is 4K. If you want the best quality display for your computer, then you need a monitor capable of displaying this ultra HD resolution. Which one should you go for, though? Well, to help give you some idea, we've been looking at six of them this week

58 DRM-free Content

DRM, the scourge of digital age. Sure, no one can argue with the fact that copyright is important and that rights holders should be compensated for their works, but DRM has the curious effect of only disadvantaging people who don't illegally download things. Thankfully, there are plenty of ways to legally obtain media files, completely free of this irritating technology

62 Hardware Modding

Have you ever looked at your current games console and thought it could be physically improved in some way? Perhaps it could do with its own built-in screen or keyboard? Well, if you're anything like Ben Heck or one of the many other hardware modders in the world, then you're probably happy to make those wishes a reality. Aaron Birch takes a look at some of the marvellous machines being put together by some very creative people

Also In This Issue...

16 Remembering
David Hayward recalls his time playing *Saboteur*

26 Top 5
When your broadband is playing up, how do you survive?

56 Code With AI2
Create your own Android web browser in simple steps

87 App Of The Week
Get your game on with a bit of *Atari Arcade*

Group Test
4K Monitors
46 Acer CB280HK
47 AOC U2868PQU
48 BenQ BL2711U BenQ BL2711U
49 Dell UP2414Q
50 Philips Brilliance 288P6
51 LG 31MU97-B
52 Sum up

Reviews
38 ViewSonic VG2860MHL-4K
39 VariDesk Pro Plus 36
40 VTX3D R9 285 2GB
42 BenQ W1350 Projector
43 Transcend 1TB SSD370s
44 Panda Internet Security
45 Start 60

Experts
82 Ask Aaron
84 Ask Jason

Specialists
68 Linux Mart
69 Amiga Mart
70 Mobile Mart
71 Hardware Mart
72 Gaming Mart

News
30 The Latest News
53 Your Letters

Regulars
54 Subscriptions
74 Ad Index
76 IT Essentials
78 Classifieds
88 Logging Off

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Getting More From Windows 7

We look at how you can put some life back into your Windows 7 build

The Windows 10 upgrade from Windows 7 and 8.1 machines has finally peaked at around 4.81% from its launch in July – according to StatCounter Global Stats. Interestingly, Windows 8.1 is still enjoying a 14.61% share of the operating system market but has dropped a couple of percent since Windows 10 became available.

The big numbers, though, are reserved for Windows 7, which at the time of writing had a huge 54.18% of the worldwide market, and it's remained fairly level even with the launch of Windows 10.

Of course, numbers and stats can be altered and manipulated to suit the needs of the presenter. And while Microsoft may well be popping the champagne corks with a reasonably successful launch, the rest of the Windows world does appear to be quite happy staying put with the stability and functionality of Windows 7, despite the lure of faster boot times and support for more exotic DirectX features.

But why? After all, Windows 10 runs well. It's certainly a lot quicker than 7, and it's lost the Metro-UI element of the desktop that almost everyone didn't like, and it's the future. It's a good operating system, better than 8.1 and, in many opinions, better than Windows 7.

Most non-upgraders will state that the OS is still a work in progress. There are questions regarding support, with 'some' hardware and software not working, and there's still the unpopular App Store. There are countless more reasons why some refuse to upgrade. Home users are probably torn 50/50 over the upgrade, but businesses have mostly stayed with Windows 7 and most likely will until they've tested every inch of Windows 10 and concluded that a company-wide upgrade is feasible and will work with their current software and for their users.

In that case, and looking at this from the home user's point of view, what can we do with Windows 7 to keep it running in tip top condition and to keep it as the OS of choice until it's finally laid to rest?

Hardware Upgrades

If you're looking for an overall performance gain across your whole system as well as within Windows 7 itself, then you'll probably want to think about upgrading or installing the current hardware.

The performance gains that can be achieved from a simple addition or upgrade can be extremely impressive and visually notable, even over the course of a year or more. Where most software-based improvements are mostly short-gain boosts, a new item of hardware can keep your system trim and sprightly over a much longer period. Plus you can take your hardware with you, in most cases, to a new setup in the future.

SSD And Hard Drive Upgrade

It's been said many times before that the best possible upgrade a PC user can make to their system is to purchase a solid-state drive and use it as the main system storage.

The read and write times are blisteringly quick, which in real-world terms translates to an immensely responsive Windows setup. And these days the reliability of an SSD is far better than the last-generation models, so there's little chance of getting one that's likely to go pop after a year's worth of use.

A decent-sized SSD, by which we mean 120GB, can be bought for as little as £40 these days, and that's a Kingston 120GB SSDNow V300 model too. Even the much bigger 1TB Samsung 850EVO SSD can be had for around £250 to £270, or the Crucial BX100 1TB for around a tenner less. The point is it's not a lot of money to spend for something that will last the life of your system while offering an absolutely huge performance boost over that time.

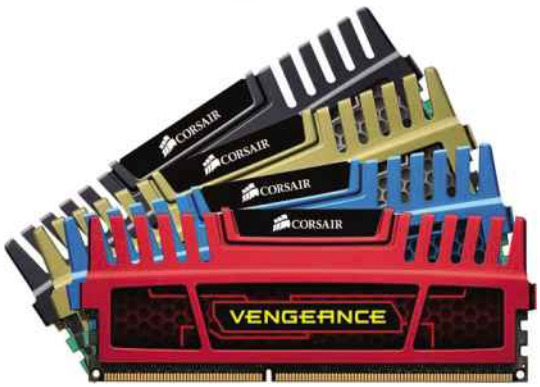
Memory

Memory is a tricky upgrade to fathom at times. If you're running a Windows 7 PC with 2GB of memory, you're probably going about your business without too much of an issue. However, with 4GB, you'll notice an improvement and you'll be able to have more programs open at once without too much strain on the overall system resources.

Once you begin to move beyond the 4GB mark, into 8GB, 16GB and even beyond, the actual performance of the PC starts to get a tad tricky to measure. Obviously, you'll need a 64-bit version of Windows 7 to utilise the extra memory over 4GB, but does it actually have an impact on the OS?

To be honest, and this is our own personal viewpoint here, if you do a lot of gaming, then upgrading to 8GB of memory is worth the spend. If you do a lot of video or image processing, or even if you use multiple Excel instances along with a constantly open Firefox with numerous tabs, a word processor and perhaps a few other things in your daily computer use, then again 8GB of memory will be of great benefit to you.

16GB of memory, on the other hand, is very useful if you plan to use and run one or more virtual machines on a regular basis. A VM



instance can easily chew up a couple of gigabytes, depending on how you've configured it, and the more you add and use, the more memory they'll take up when they're powered on.

We have 16GB in our work PCs, which is mainly due to the presence of virtual Linux distros being tested, gaming and the number of programs we often have open at the same time. Most average users, however, won't even get as far as checking their Facebook status, so in their case 4GB will be more than enough.

Basically, 8GB of reasonably fast memory can cost as little as £30, and 16GB of the same kinds of speeds (we're looking at around 1600MHz) costs in the region of £65. Gaming these days is generally tweaked for 8GB PCs, and running a VM is ideal if you have 16GB of memory. Based on these, a performance boost in Windows 7 should cost you very little. It just depends on what you want to do with your system.

Motherboard And CPU

It's fairly obvious to state that with a faster processor and a more modern motherboard, Windows 7 will perform a lot better than on a setup from a previous generation.

The problem here is that the hardware upgrade to a motherboard and CPU presents a significant increase in expense and considerable time spent having to reinstall Windows onto the new system.

Due to Windows licensing arrangements, there are certain circumstances when upgrading becomes a more expensive task than you first imagined. If you're simply upgrading the hard drive, the graphics card or the memory, then you're generally fine with the current version of Windows 7 you own.

If you have an OEM version of Windows, however, that came with your PC, then you won't be able to upgrade the motherboard and the CPU, because this is now classed as a new PC, since the licence is tied to the original computer.

If you own a retail version of Windows 7, one you bought from a shop or online, then you're okay to move the licence to a 'new' computer, but you'll need to clean reinstall the operating system and reactivate it via the usual methods.

So yes, while a motherboard and CPU upgrade will make a difference to the performance of your Windows 7, you might also have to factor in the cost of a new Windows 7 licence. Either way, you'll need to perform a reinstallation of the operating system, along with all the relevant drivers, updates, patches and transfer across your work and settings for whatever browser you use, among countless other things.

Graphics Card Upgrade

If you're using the basic GPU that comes with the motherboard or CPU, then you'll notice quite an improvement in the visual performance of Windows 7 if you upgrade to a dedicated graphics card.

It's a very basic solution really; a GPU and its drivers can take the visual load off the CPU or other motherboard components and handle the processing itself, together with whatever memory the graphics need.

So if you're used to loading up images and manipulating them with your built-in GPU, then a new graphics card will use its processing power better and do the job without having to rely on the CPU. This will naturally free up the CPU and the system memory to load up the rest of the program or just be on hand to help step up the performance of the system.

If you fancy doing a spot of gaming, then a new and dedicated GPU will offer far better performance than anything you'll find in a built-in solution. That much is obvious, but a new GPU won't let you load up Facebook faster or improve the boot times of Windows 7.

It all depends on what you do with your Windows 7 PC. If you do any of the above, then the chances are you'll already know what GPU will make a marked improvement. If you're not sure but you fancy giving it a go to see if there's a slight improvement in the everyday tasks you perform, then a reasonably good graphics card will set you back as little as £20.

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Just as a quick note, though, before you go ahead and spend that £20, check that your motherboard is capable of having a graphics card fitted to it – i.e. it has a free PCIe slot.

Software

Software updates frequently offer, as we've mentioned previously, just a temporary gain in overall system improvements. However, they're free and only take a portion of your time, as opposed to having you dip into your wallet.

A Reinstall

We'll start the software improvements off with the single most effective performance upgrade you can do with Windows 7: remove it and reinstall it.

Over time, your Windows 7 build will become cluttered with temporary files, installed and removed programs, lost registry links, cookies, browser update files that haven't been removed correctly and even Microsoft updates that are still hanging around and taking up space. All these combine to make your PC feel more sluggish than it was when you first powered it up, and they significantly bloat the system like an all-you-can-eat buffet.

It requires a fair amount of work, admittedly. You'll need to back your work up, back up your passwords and usernames for whatever

Is Windows 7 The Next Generation XP?

Here's an interesting question: will Windows 7 become the new XP and hang around for over a decade before finally being hit over the head with a shovel and forcibly placed underground?

At present it's certainly looking that way, and here's why:

● Windows 7 is a simple interface with a classic Start button, desktop and themes. It doesn't have access to the App Store, it doesn't use touchable tiles, and everything is in a fairly logical place.

Windows 8.1 really riled the user base with its unique desktop and the fact that to shut it down (before the update) you had to click three or four different items. Windows 10 is significantly better, but it still has tiles and the app store – things that have made the Microsoft user base quite irate in recent years.

● It's stable, mostly. We have a few Windows 7 builds here, and not one of them has ever blue screened, failed to boot, had a bad update and needed to be rolled back, or suffered a sudden freeze when being put through its paces.

We also have some Windows 8.1 machines, and they've given us quite a few headaches with dodgy MS updates, poor performance after driver updates, blue screens and often failure to boot. It's not that all Windows 8.1 machine suffer from these ailments, but in our experience they have so far.

● Support. While XP support is no more, Windows 7 is to be supported by MS until 14th January 2020, with extended security patching to last, oddly, until a day later. So the company that has already gone through a substantial XP upgrade to Windows 7, while possibly retraining its staff and making double sure that mission critical software and systems will work with Windows 7, is hardly going to start all that off again for Windows 10.

The expense of such a task is daunting, especially if you don't have a dedicated IT team to help the company. Hiring a team of specialists is a cost most companies can do without, just as much as changing to a new operating system.

● The damage done by Windows 8.1 was quite significant. When Vista was launched, everyone hated it, but thankfully for Microsoft there wasn't a Twitterverse or similar around at the time, and the bad press was largely limited to what you read in the magazines.

Windows 8.1, though, failed in front of the entire online world, and it brutally hurt the Microsoft PR campaign. Whereas XP was both Microsoft's greatest success and failure in the same breath, in that it worked but stopped people from upgrading to Vista. Windows 7 has done the same with Windows 8.1, and due to the aforementioned worldwide blasting of 8.1, it looks like there's a lack of interest in Windows 10.

● Money worries. If Windows 10 is to be the last desktop OS from MS, as far as we can tell, how is the company going to make money in the future? There are other avenues, of course, but some companies are starting to take into account that future service packs and patching or even features may end up costing the user.

There's the possibility that better version of DirectX in the future could come as a costly upgrade for Windows 10. Then there's this whole 'Windows as a service' thing, where the initial year is free, but then you have to cough up some cash beyond that. Are we going to simply end up renting Windows from Microsoft, much in the same vein as Office 365?

● Windows as a service is a worrying feature for future home and business users. After all, you buy a Windows 7 licence, and you get what you expect: an operating system that's yours and works on your hardware.

With Windows as a service, there's a worrying uncertainty about the OS, as it may not end up being the same OS you opted to buy after several significant updates. If Microsoft is going to implement features on the fly as the OS continues, then how are companies and users going to be able to opt out or test these new features with their current hardware?

● There are far too many unknowns at the moment for a company to seriously consider the move from Windows 7 to either Windows 8.1 or Windows 10.

Will Microsoft ditch all support for Windows 8.1 and brush it under the carpet? Will Windows 10 become a subscription service that's at the mercy of whatever Microsoft wants to force on users? And what about the actual desktop? Will it remain in a more traditional format or change to something that's more mobile based?

These are expensive questions for both sets of users, and as a result the stability and simplicity of Windows 7 is looking better by the day.

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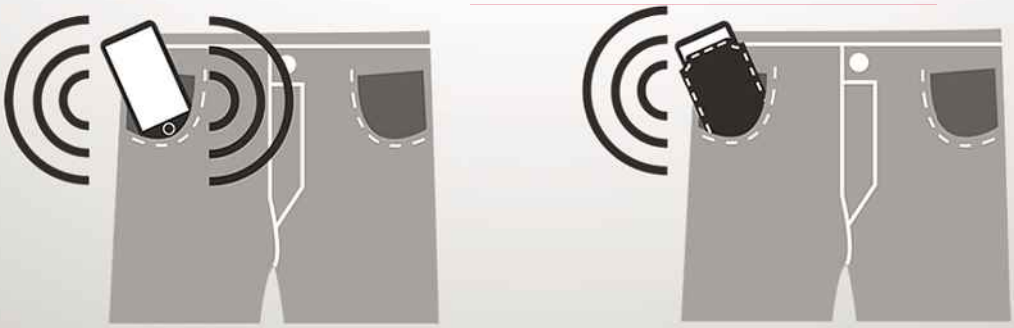

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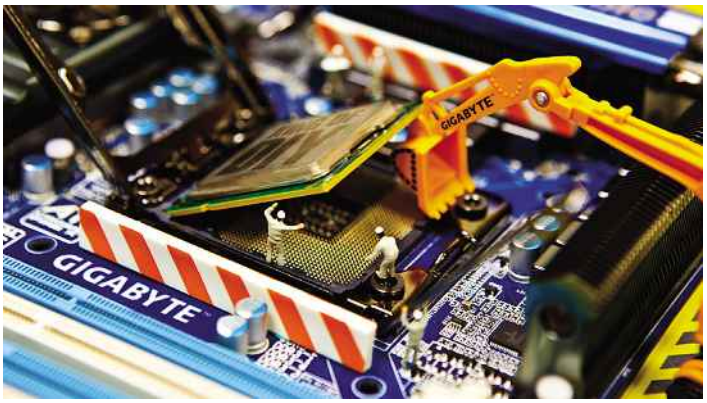


browser takes your fancy, make a note of the programs you use and have installed, locate any drivers for the motherboard (because the network port might not work with a clean Windows 7 installation), and you'll need to make sure the Windows 7 licence key is correct, as well as any other licence keys for your usual programs.

Once you've done all that and double-checked to make sure everything really is backed up, you can then go ahead and reformat the system drive, insert your Windows 7 disc or USB stick and go ahead with the installation.

You'll need to set a weekend to get everything back to the way you want it, though. Even on a fast broadband line, the accumulated Windows 7 updates, patches and Service Packs can take a seemingly infinite time to download and install. Then you'll need to transfer all the backed up data and settings over and update the system with whatever drivers are available.

After you've done all that, you're left with a clean system, free from the bloat that populated it prior to the reinstallation. It'll feel quicker, boot faster and be far more responsive than it will in another six months to a year.

Considering it doesn't cost anything other than time and careful planning, it's certainly a worthwhile performance boost to the entire system.

Update Your Drivers

If a total reinstallation sounds a little too daunting, then a good suggestion to put a little life back into a Windows 7 build is to check that you have the latest drivers for all your hardware.

Most hardware these days does a pretty good job of periodically scouting for new drivers, graphics cards probably being the best of the bunch. But other hardware, such as the motherboard or the components used on it (such as the sound, network and so on) don't often get touched after the initial Windows 7 setup.

You won't get a huge system impact from updating the sound driver, for example, but a newer version may be more streamlined and could have cut out any known bottlenecks that have been noticed from the previous version. The same goes for other component drivers too.

Nevertheless, it's a system tweak, so it's worth mentioning.

Defragging?

Is Defragging a hard drive a worthwhile tweak, to eke out a slight performance improvement? Or is it a total waste of time?

There are arguments both for and against running a Defrag, which we won't get into here. Suffice to say, many people in the for camp have said that they achieve a modest improvement in their system after a good defrag of their drives. That being the case, it might be worth going through the motions to see if anything can be gained.

Again, the only resource it consumes is your own time.

Services

While being the very essence of the Windows operating system backbone, the services that continually run and monitor every detail of your computer can have the nasty habit of consuming more than their fair share of valuable resources. Some of these services you'll definitely need for the proper use of your PC, but others you won't. It really depends on what you do on your computer, so rather than cater for every possible use and contingency, we'll just list the services that you won't need for a general home PC.

To enter your services, you can simply press the Windows key and 'R' on your keyboard, then type in 'services.msc'. This will list all the available services on your PC; whether they're currently running or not; how they're executed and started (either automatically on system startup, manually by the user or another application); and a brief description of what they do.

To free up some resources, you're going to have to stop and disable a selection of these services. This can be quite daunting to the casual user. If, however, you disable a service and you then find that the task you normally do stops working, then it's an easy enough case of re-enabling that service again, so it's also a good idea to make a note of what you have disabled, in case you ever need to reactivate it again.

To stop and disable a service, left-click to highlight the particular service in the list, then right-click and select 'Properties' from the menu. A new window will pop up, which will have several buttons and a drop-down list. Click on the Stop button, then click on the drop-down menu next to 'Startup Type:' and select 'Disabled' from the list. Click OK, and there you have it: the service is stopped and prevented from ever starting up again.

Here's a list of the services that can be stopped and disabled for the average home user and what they do:

Application Management: Processes information, removal and enumeration requests for software deployed via Group Policy. When disabled, users won't be able to install, remove or mess around with software deployed over the network through the Group Policy. In other words, unless you're attached to a big corporate network that installs software remotely, you won't need this service.

BranchCache: Used to cache network content from the local subnet. Can be used by computers that are a part of a global network infrastructure, when communicating with the company's central server, to cache information requests.

Certificate Propagation: Copies user certificates from smart cards into the users certificate store. Although it's used by smart card readers, generally speaking it's only ever utilised when dealing with the network Group Policy. If you have a smart card reader, then stop and disable and test it. If it still works perfectly fine, then you can keep it disabled.

Computer Browser: This service maintains a list of the computers on the network. If your computer is the only one on your home network or you don't communicate with any of the others in any way, shape or form, then you can happily stop and disable this service.

Credential Manager: Provides secure storage for login credentials, when used with vault software. Not really needed by the home user, unless you use a vault manager application to store usernames and passwords.

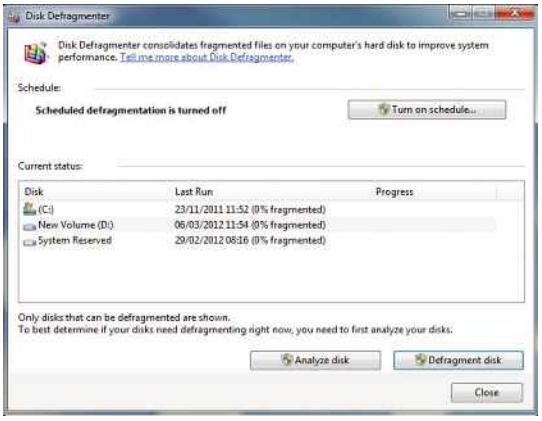
Desktop Window Manager Session Manager: Apart from having a ridiculous name, this service will provide maintenance for Windows Themes in case they muck up. If you have a bare desktop and you don't use or want fancy effects or themes, then stopping and disabling this service could save up to 190MB plus of memory.

Distributed Link Tracking Client: Maintains links between NTFS files across computers in a network. If you have a file on Computer A and a shortcut to it on Computer B, then this service will keep track of that link even if you move it to another location. Apparently, it's also used by earlier versions of AVG when scanning, but if you don't use networked links to other computers (or they remain static), then experiment with it turned off.

Fax: Allows you to send and receive faxes. Does anyone use faxes any more?

Tablet PC Input Service: Enables tablet PC pen and ink functionality. Are you using a tablet PC? If not, then stop and disable.

Themes: Provides user experience theme management. If you want to save several hundred



megabytes of memory (along with Desktop Window Manager Session Manager) and you don't care about fancy desktops, then stop and disable themes.

Windows Search: Provides content indexing and search results for files, emails etc. Generally, searching for a file doesn't take that long on a computer. Disabling this service will save your system from continually accessing the hard drive, but you won't be able to use the search function any more.

Windows Features

Within the Control Panel > Add/Remove Programs, you'll find a link called 'Turn Windows Features On or Off' on the left of the panel. It'll take a minute or two for it to load up once you've clicked it, but when it appears, you'll get a list of tick boxes with various names to them.

Each one of these is a feature of Windows (obviously) and takes up a certain amount of system resources when active, be that memory or from the CPU. You can quite happily remove some of the features without compromising the ability of Windows 7; it's just a case of knowing which ones to safely untick.

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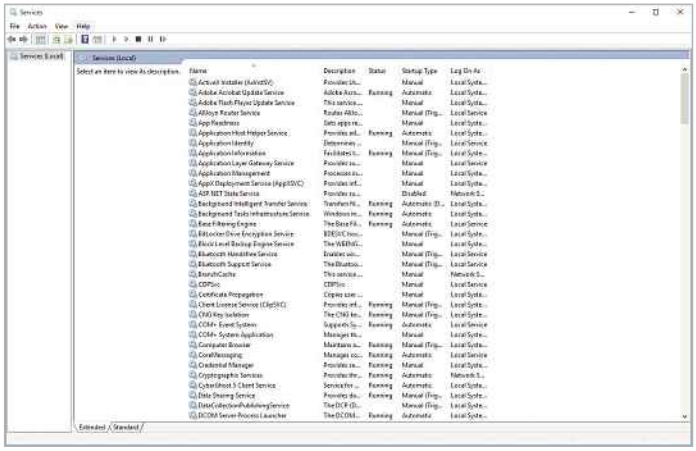

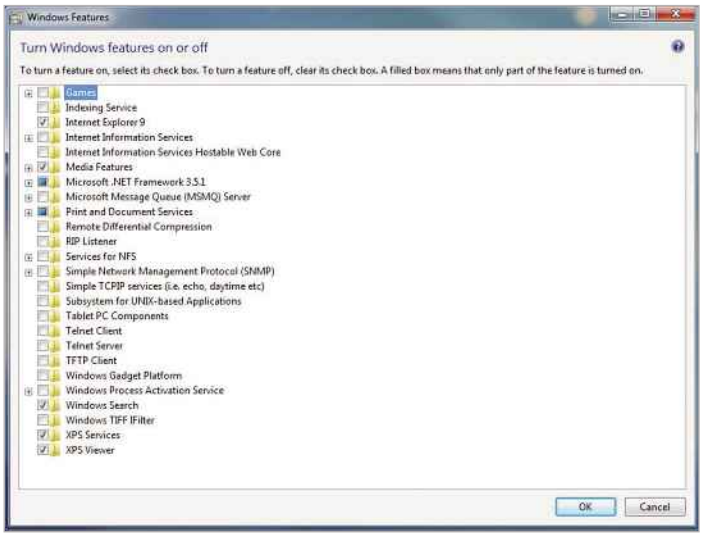

Games: Windows games are quite good fun occasionally, but they do take up some space: roughly 142MB. That may not sound like much if you own a 1TB hard drive, but for those on slimmer hard drives or an SSD, every spare megabyte counts. If you're bored with the pleasures of Chess Titans or Purble Place, then you can either untick the entire group or keep one or two for entertainment's sake by unticking individual items.

Internet Information Services: IIS provides support for web and FTP servers. It's unticked by default, but there have been times when the box can become ticked through a trigger happy third-party application. If you don't host a web or FTP server from your PC, then you can untick.

Media Features: Inside the Media Features group you'll find Windows DVD Maker, Windows Media Center and Windows Media Player. If you have no need for these (i.e. you use a third-party player/recorder/media centre), then go ahead and untick.

Remote Differential Compression: RDC allows data to be synchronised with a remote source using Microsoft compression methods to minimise the amount of data sent across the network. In theory, it's a nice idea, but it can lead to a huge amount of lag in bandwidth across the network. People who have unticked RDC have claimed a massive improvement in network transfers and media hosting. Generally speaking, the average user won't need RDC, so by all means untick and see if it's made any difference.

Windows 10 Support

We're not bashing Windows 10 in this piece or Windows 8.1 for that matter. The fact is we like Windows 10, and this writer even goes so far as to state that Windows 8.1 isn't too bad either.

In fact, Microsoft has taken great lengths in making the transition to Windows 10 a much smoother process for its users. Take, for example, the upgrade process itself. While it has notably consumed a lot of the internet's bandwidth over the last month, it was actually one of the easiest OS upgrades we've conducted in a long time.

Further to that, support for the OS is to last until 13th October 2020 with extended support to last until 14th October 2025, so there's ample support for the next decade for the company's newest operating system.

In addition to the support for the core OS, the Windows as a service element has the company trying its best to improve the user experience over time without the user having to upgrade to a new OS with every subsequent release. It means, of course, that you'll always have the latest operating system on your system, so the support for it will continue, depending on the upgrade cycle for the foreseeable future.

Finally, there's been a significant change to the Microsoft support and Technet pages relating to Windows 10. It's now easier to find individual categories for installing and upgrading, accounts and billing, connectivity, and advice on security and privacy. While it's still not enough for those who like to moan about such things, it's definitely an improvement on the previous Windows releases.

Simple Network Management Protocol (SNMP): This is another set of features that despite being unticked by default can have the nasty habit of rearing their heads if an application is installed that thinks they would be useful. In truth, unless you monitor network activity (load, bandwidth, users etc.), then you won't be needing SNMP on your home PC.

Tablet PC Components: Again, if your PC isn't a tablet, then you can safely untick this box.

Windows Gadget Platform: This allows you to display gadgets on your desktop, which although possibly useful now and then are a massive resource hog. Unless you desperately want Windows Desktop Gadgets, untick the box.

And Finally...

If it's a free tweak you're after to get a little more out of your current Windows 7 build, then the last bit of advice we can give is to simply take a moment and consider if you really need certain software installed.

Take a look at the Add/Remove Programs list and get rid of the stuff you never use. The chances are it has some hidden element that will take up resources on your PC without you even knowing it.

Conclusion

There's a good selection of hardware and software tweaks that can help you get more from your Windows 7 build and to help keep it trim.

As you would expect, there are many more, but we'll leave you with these ideas for now.

As for Windows 7, it looks like there's life in the old dog yet. **mm**

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Remembering...
Saboteur

David Hayward dons his ill-fitting ninja suit and tries to do the splits

The 80s were a time of rubber keyboard computers, six BBC Micros in the entire school, amazing magazines and games with artistically drawn covers and ninjas. Ninjas were everywhere in the 80s, you couldn't walk down the high street without some image of a ninja jumping out at you, brandishing a terrible weapon of sorts.

Saboteur, then, was perfectly pitched for the era. You played the role of a highly skilled mercenary, trained to the highest degree and the blackest of darkly coloured belts. Dressed as a ninja, you were employed to infiltrate a secure facility and steal a disk containing the names of all the rebel leaders before the information was transmitted to the enemy.

You worked against the clock and were up against an army of soldiers, guard dogs and remote cameras that could fire at you. You enter edvia the sea, in a blacked-out rubber dinghy and fought your way through the warehouse and underground tunnels, stealing the disk, engaging the guards with the weapons you found throughout the levels, before exiting via the roof to a waiting helicopter.

Although the game was made up of over 118 monochromatic coloured screens, the animation of the titular ninja was superb, as were the various guards, dogs and other elements that helped make up this wonderful release.

It may not have broken any new ground in terms of what the Spectrum was capable of, but *Saboteur* was one of the most played games of the decade. It was also one of the most copied, and many gamers of the time will no doubt recall the big anti-piracy campaign that came with the games that were released during that era.

It was an impressive game to map and spawned a couple of sequels (the third was never released), as well as many modern remakes for a variety of different systems (mostly Windows). It was the talk of the playground and resulted in a plenty of pages of hand-drawn maps, pokes and other tips being exchanged during class (usually when the young gamers should have been paying attention to the teacher).

Its History

Saboteur was the brainchild of Clive Townsend and was published by Durell Software Ltd in 1985.

Did You Know?

- I met Clive Townsend at Retro Revival last year and bought a *Saboteur* T-shirt off him.
- It cost £8.95 when it was released.
- The Commodore and Amstrad CPC versions were good too, but it's the Spectrum version that was the best seller.
- The third game in the series, Saboteur 3D, was never released, but Clive is working on a more modern version.

Townsend was previously working on another Spectrum title called *Death Pit*, where a miner was set to explore an underground labyrinth in search of treasure while avoiding snakes of various colours, as well other denizens of the pit. The game, however, wasn't up to scratch, as Durell bosses would have it, so the majority of the code instead found its way into another title that Clive was working on, *Saboteur*.

The game was a big hit and as a result a sequel was made, *Saboteur 2: Avenging Angel*, with the sister of the ninja in *Saboteur* taking on a role of revenge for the death of her brother. The map for *Saboteur 2* was even bigger and a credit to the coding skills of Townsend.

The Good

An amazing game with large graphics and stealth mechanics. Ninjas!

The Bad

Entering a screen and ending up with a guard dog running alongside you, sapping your energy. Damn dogs!

Conclusion

A fantastic game from a more simple time of home computers. Hands up who played this with the map from Crash laid out on their knees? We certainly did, and we enjoyed every minute of it.

Thanks, Clive, for an ace game.

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Wanna See Banned Footage? Try **Pornhub...**

When something gets yanked from YouTube, where does it end up? Porn sites, apparently!

Don't turn the page yet, we're not talking about anything NSFW. Well, maybe we are – your boss probably wouldn't like you skiving off work to watch trailers for an upcoming computer game, after all. This isn't an article about porn. It's about the internet, and file hosting, and the fact that it's become virtually impossible to stop people sharing videos with one another, no matter how much legal clout you've got.

Let's start at the beginning. So, Bethesda Studios is set to release the latest instalment in its *Fallout* franchise, *Fallout 4*, on November 10th this year. The post-apocalyptic roleplaying series is a popular one, and hopes for the new sequel are pretty high. Pete Hines, Bethesda's vice president of PR and marketing, has been seriously talking it up, saying "It could be our biggest release ever."

Fans are basically champing at the bit to get a glimpse of the new game but, so far, Bethesda has been doing its best to keep it under wraps. At Gamescom, the computer games trade fair held last month, the *Fallout 4* demo was an unusually secretive affair, with journalists and other industry types taken into a darkened, secured room before being allowed to watch a gameplay trailer. They then gleefully reported what they'd seen

and how awesome it was, but Bethesda kept the actual footage off the internet – or so it thought.

However, some enterprising soul at that top secret event sneakily filmed the showcase, and stuck the footage up online. YouTube, which is pretty quick to clamp down on illicit releases like that nowadays, removed the videos almost as fast as they were posted, but fans still clamoured to see what *Fallout* goodness they were in for. Another video hosting site was needed – one that wouldn't be so quick to delete the footage.

Enter Pornhub.

Not Your Average Video Hosting Site

Pornhub, as the name suggests, is primarily a site for pornographic videos. Launched back in 2007, it's a lot like a XXX-rated YouTube, hosting all kinds of content, both professional and amateur, with social features like sharing and commenting built in. At first glance, it's probably not the obvious place to stick a video of computer game-related footage – but that's exactly what happened.

"The wobbly, poorly framed video racked up 200,000 views over two days before Pornhub got round to taking it down"

The *Fallout 4* video was uploaded to the site under the, er... euphemistic title "HIDDEN CAMERA SHOWS AUDIENCE TEASED BY BIG BUTT MAN IN TIGHTS LIVE." There might've been some disappointed punters, then, but *Fallout* fans seemed to have managed to find it okay, and the wobbly, poorly framed video racked up some 200,000 views over two days before Pornhub, too, got round to taking it down.

Considering the number of headlines, you'd think no-one had ever uploaded games-related video to a porn site before, but it isn't as unusual as it first appeared. On gaming forums, porn sites are regularly recommended as hosts for gameplay videos that content creators may not want out there. YouTube has strong relationships with gaming companies, and is quick on the draw when it comes to getting rid of material such as the Fallout footage. Pornhub *et al* don't tend to have those links – plus, games companies keep a keen eye on YouTube, while they tend not to be so vigilant around porn sites.

Legalese

In a recent Reddit Ask Me Anything session, Pornhub staff admitted that, while 99% of the material uploaded to their site is pornographic, there are people who use the platform to post gaming and sports videos instead. That's because, while it was designed for sharing the kind of sexually explicit content that most other social media sites ban outright, Pornhub is far from being the wild west you may imagine. It's got its own set of rules, and its terms and conditions are long and detailed: as well as forbidding abusive, defamatory, and hateful content, Pornhub makes users agree not to submit material that's copyrighted, or otherwise protected by law (you can read the whole policy here, if you're so inclined: **www.pornhub.com/information#terms**).

Obviously stating something in the T&Cs doesn't automatically mean that all users faithfully follow the rules, so Pornhub has a flag facility whereby any user can report an inappropriate video to moderators. There's also a Support section where users can get in touch to report videos they want taken down – often,

What We Know About Fallout 4

Since shaky cam footage makes us travel sick, we didn't watch the leaked footage. If you're hungry for news on *Fallout 4*, though, here's what we know so far:

- The character development system, which lets you train your character in a variety of traits (Strength, Perception, Endurance, Charisma, Intelligence, Agility, and Luck) looks to be largely the same as it was in *Fallout 3*
- Actually. quite a few things are pretty similar to *Fallout 3*; there's open world gameplay, a camera view that switches from first to third person and the return of Dogmeat!
- The character design engine, though, has been updated – *Fallout 4* will use the same Creation Engine as *Skyrim*, and that'll mean you can customise your character's face to look exactly as you want it to
- Mobile devices will be integrated with the game, acting as a second screen
- The actual story is being kept as secret as possible, because Bethesda wants players to actually experience the game without knowing too much about what's going on beforehand
- It'll be released on 10 November!

used by victims of revenge porn – and Pornhub's team say they act immediately to remove videos when they get those kinds of reports. So, it's not that Pornhub doesn't care that copyright infringing content was being hosted on the site, it's that no-one expected it to be there; once it knew, it was removed.

In the end, then, this really isn't a story about porn at all (though that might be why it got so much attention). It's about how, no matter how hard companies might try to stop them, people will find ways to access and share whatever content they want. Even if it's badly filmed, even if it's a trailer for a game that'll be out in a couple of months anyway. If enough people want something, they'll find a way to get it, which leaves content creators playing an increasingly frantic game of online Whack A Mole. Take a video down on YouTube, and someone else will upload it. Take that one down, and the same video will show up on Vimeo. Take that down, and it emerges on VideoJug. Take that down, and it turns up on a porn site. And so on, and so on.

All This Has Happened Before

It's exhausting to think about, but the *Fallout 4* footage leak is far from the first time content has turned up online before its creators or distributors wanted it to. Trailers often end up on video sites after being shown to audiences at conventions, even if people are asked not to film them on their phones. Hotly anticipated albums almost always end up available for illegal download before their official release dates – just ask Lady

Gaga, or One Direction. A complete, high quality version of The Expendables 3 managed to make it's way online even before the film's cinematic release, costing the studio potential millions in lost revenue. Internet piracy is so commonplace that it's become a normal part of the media landscape.

You might think, well, who cares? After all, it's not like Gaga or Sly Stallone are hurting for cash, and cinema tickets are expensive. If we take a step back for a moment, though, it's pretty obvious that there are knock-on effects of piracy.

"The Fallout 4 leak is far from the first time content has turned up online before its creators wanted it to"

Entertainment products don't come into being all by themselves; they take dozens, or maybe hundreds, of people to get them made and finished and in our grubby mitts. Piracy actively harms entire industries, and damages the livelihoods of all kinds of people, most of whom are normal people like you and me, and get paid a moderate wage for their efforts.

In the case of the *Fallout 4* footage, we're only talking about a brief presentation, not an entire game, and so maybe you could argue that no-one got hurt by the leak. After all, fans aren't going to skip buying the game just because they've seen it; if anything, it's fed people's appetite to play it. Yet, whether or not you reckon Bethesda's marketing team should've played this one differently, the fact remains that it's the owner of that footage, and not down to it to decide when it gets released.

At the end of the day, we don't have a right to see any game – or book, or film, or album – before its release date. Putting the *Fallout 4* footage on Pornhub might've meant a few thousand more fans got to see it than otherwise would have done at this point in time, but it probably also means that, in future, big media companies will be watching smaller video hosting sites as closely as they monitor YouTube for leaked content, leaving us to wonder where on the web could turn up next. **mm**

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Is Hacking Getting Worse?

Mark Oakley looks at hacking's murky recent headlines and wonders if things really were better in the 'good old days'

August's Ashley Madison data dump was something of a wake-up call for adulterers everywhere. Since news of the site's hacking surfaced in July, the online dating site has received the sort of media attention that no company wants. Those registered to the site, meanwhile, would have been nervously keeping one eye on internet forums to check that their names and email addresses hadn't gone public.

Well, now they have, and many times over too. Indeed, the group behind the hack first posted 10GB of data onto the dark web, complete with names, email addresses and credit card details. Then more data dumps happened, and the headlines began. In Australia, a radio station decided that it would be quite the wheeze to reveal one of the chaps from that database to his wife because, you know, ruining a married couple's life is so entertaining. At the time of writing, various names were being named in the press as being included in the link, and online databases allowing people to search to see if their name was on it were being overrun by the high volume of visitors. Then, news came of suicides related to the data breach, and the scale of the impact of the data breach took on an altogether more serious tone.

What's certain is that this is threatening to become one of *the* hacking stories of recent years.

Whatever your own personal take on the Ashley Madison affair, from my point of view it's just another in an increasingly long line of high-profile and widespread hacking cases to have made headlines the world over.

Last year, in particular, seemed an especially fruitful one for hackers.

2014: Hacking's Worst Year?

Throughout the course of 2014, the computer systems of Sony, eBay, Kickstarter and Tesco were just some of the many, many hacking stories that seemed to dominate news pages.

It's fair to say, certainly in terms of column inches, that hacking was one of the major tech stories of last year. Looking at perhaps the biggest of those stories, the Sony hack was notable for suggestions at the time that it could have been related (bizarrely) to one of its upcoming films, the underwhelming *The Interview*. Said movie took a comedic look at Kim Jong-Un, and when the FBI confirmed that the hack did indeed originate from North Korea, those theories seemed more watertight.

You'd think Sony would have learned. This particular attack was borne out of hackers managing to install wiper malware on its systems, but back in 2011, hackers had already exploited its systems by entirely different means, causing a mighty outage on the PlayStation Network. When that massive outage happened, consumers made their disgruntled voices heard very loudly, and you would have expected those in control of its cyber security to have shored things up.

Sony is obviously one of the more high-profile companies out there and is therefore more susceptible to hacking than most. On that basis, surely it should keep an eye on the more sophisticated methods and keep them out?

What was notable for the big headlines in 2014 was that each of the firms involved were major companies providing services used by millions. For hackers, the targets have just got bigger, and while Sony is one example of where lessons don't seem to have been learned, on a wider scale there are plenty more.

Celebrity Hacking

In 2014 (when else?), a store of nude photos of celebrities was leaked. Involving hundreds of explicit snaps of celebrities, this was major news and not least because of the scale of the photos involved and the high profile of many of those affected. Also, the fact that these images were being stored via iCloud was headline-fodder for the media, which reportedly led to a rethink of Apple's service, with additional security steps including notifications regarding account access.

With the FBI getting involved, there can be no doubt of the seriousness of this. It's hardly the first time that celebrities and technology have mixed with bad results, though. In 2011, private photos of Hollywood celebrities including Scarlett Johansson were leaked online, and the man responsible, Christopher Chaney, was sent to the clink for ten years for his crimes. Thankfully, this kind of thing does lead to prison time if you get caught, but it's clearly deeply upsetting for people to learn that the cyber security they thought was protecting their private information wasn't actually strong enough to stop horrible people from doing horrible things.

And people have been at this game for years.

Hacktivism Begins

One of the earliest cases of high-profile hacking with a purpose was probably in 1989. Nasa was on the victim side of the coin, as the 'Worms Against Nuclear Killers' worm was unleashed on its computers.

The worm with the faintly incendiary name (we'll let you work out the rude acronym for yourselves) was put to work by Australian hackers in protest at America's involvement with the Galileo space probe, fuelled by plutonium.

Spin on a decade and the US Department of Defense was under attack – by a high school student. Jonathan James from Florida managed to embarrass the US military by compromising the department's computer system. James intercepted a bunch of highly classified emails by installing backdoor software, including gaining some information about the International Space Station. In the end, he was caught and placed under house arrest because of his age rather than spending time behind bars. Tragically, he committed suicide in 2008.

As for other historical events of note, the Morris Worm is another that's worth a mention. Robert Tappan Morris created the worm to find out its reach, hence ascertaining the sheer scale of the World Wide Web. The worm reportedly infected around 6,000 systems and caused hundreds of thousands of dollars worth of damage.

> **"It's also fair to say that the reporting on hacking has become more sensationalist"**

Hackers Make Headlines

While last year and, indeed, this one have undoubtedly been stand-out years for hacking stories, they're not alone.

Alongside the already mentioned attack on Sony's PlayStation Network in 2011, that same year saw its own fair share of major incidents. Epsilon, one of the world's largest email marketing firms, was targeted by hackers, which meant access to millions of users' email records. The company was said at the time to handle over 40 billion emails every year and customers of various credit card, and finance companies were warned to keep an eye out.

In that year too, aerospace and defence firm Lockheed Martin was compromised, as hackers used SecurID codes stolen by an attack earlier in the year on security firm RSA. Luckily, the hack was found out before any lasting damage occurred. Then there were the Chinese hackers who targeted Gmail in an attempt to get into the personal accounts of various members within the US government. And let's not forget that this was the year that hacker group LulzSec was born.

So while the last couple of years have been notable for cyber-security attacks, you could easily argue that many of the years in recent times have similarly been havens of hacking activity. Take 2012's attacks on Foxconn and MasterCard. Or 2010's data breaches at VeriSign and Gawker Media. Hacking has had many a good/bad year, although last year and 2011 remain real stand-out ones.

It's Getting Worse All The Time?

While the actual incidents are occurring year after year, it's probably fair to say that the actual numbers of affected/exposed records are increasing. For example, according to research from US analytics firm Risk Based Security, the number of exposed records in 2013 was 823 million, compared with around (just) 265 million in 2012, and under 100 million in 2010 (there were over 400 million exposed records in 2011). It does appear generally that more records are being exposed as time goes on.

It stands to reason too that as more and more of us obtain and use web-connected devices, the possibility of consumers being lax with their own online security increases. Our dependance on cloud services has led to a culture, among many, of placing all sorts in the web space without giving it a second thought. That's worrying and a real boost to hackers looking to take advantage.

Digital services, like Ashley Madison, obviously have to be accountable for looking after our data. The bottom line, though, is that no cloud-based or web-based service is 100% foolproof.

"Surely we all have to take some responsibility for our own information?"

We were all warned against putting all our faith in the cloud when big firms like Apple started to rely on it so much. We all enjoy the convenience these services offer us, but too often consumers are then prepared to turn a blind eye when it comes the security of that data, happy to leave it up to someone else to deal with. In some respects, it's a bit of a cheek for consumers to rail at the companies for not looking after our data sufficiently when things go wrong. Surely we all have to take some responsibility for our own information? Much in the same way that you'd protect your own storage and data at home, why not take measures to carefully select and protect the data we place in the cloud?

What I am also certain of is that sections of the British media have an appetite for the destruction that comes with hacking stories. It makes excellent column inches and attracts a sentiment among a certain readership that panders to a culture of worry and chaos. Fearing the unknown is nothing new, and news of stolen data, ruined lives and comeuppances is unfortunately exactly the kind of thing that sells newspapers and drives web traffic.

While hacking on a wider scale does seem to have become greater as our reliance on the cloud has increased alongside the adoption of online services and profiles, hackers themselves have become more determined to upset some of the world's corporations in a bid to upset the status quo. There are various core reasons behind hacking: hacking for disrupting people's lives, hacking for hacking's sake, and hacking for protest. With the creation of groups like LulzSec, hacking with a purpose has certainly increased in recent years.

It's also fair to say that the reporting on hacking has become more sensationalist. Going back to the Ashley Madison data breach for a moment, a selection of headlines included 'The Ashley Madison Hack Ruined My Life', 'What to say if your spouse finds your name on the list', 'Do YOU trust your partner?' All of these are designed to get people clicking to those web pages and buying the print editions of those media sources concerned. The Ashley Madison case is a particularly 'sexy' one for media outlets to grab hold of, and it has undoubtedly brought hacking into the mainstream consciousness.

Hacking does, in general, seem to be getting more widespread, and the targets are certainly getting bigger. As for whether it's getting worse, hacking has been a problem for years and, unfortunately, it's likely to remain that way. **mm**

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Top 5 Things To Do When Your Internet Is Down

When disaster strikes, what can you do?

1 Wait

Broadband connections these days are generally reliable, so when they do go offline, there's a good chance they'll be back pretty soon. With that in mind, you can simply wait until that happens, patiently staring at your non-functional web browser, while tapping your fingers on your desk, then looking towards your router to see if the right lights are on, before returning your gaze to your screen again. You can repeat this process until the internet is back or until you get bored and realise that there's a bigger problem.

2 Reset Everything

Although it's become something of a cliche, turning things off and on again really can make a difference, so reset your router, your PC, any network switches or Homeplugs, adopt the most difficult yoga position you know, and try again. If the internet still won't work after a reset, then it's quite likely that the problem lies not with your equipment but with the broadband connection coming into your house. The good news is it's not your fault.

3 Cry

At this point, you are now allowed to sob heartily and shamelessly. Your ability to watch cat videos on YouTube has been stolen from you, and you can no longer share those videos with your Facebook friends.

Of course, the next thing to do is to pull yourself together and phone your ISP to demand they fix it. With any luck, they'll be able to do something over the phone, but if not, then you'll have to book an engineer in to come round your house and fix the problem. When they tell you the next free appointment is in two weeks, you're once again free to burst into tears.

4 Play Solitaire

Thankfully, not everything on your PC requires you to have a working internet connection, so rather than doing something productive that doesn't involve your computer like, say, reading a book or going outside, you can simply while away the hours playing the games built into Windows or, if you're a more serious gamer, then you might be able to play your Steam games in offline mode. You won't be able to play any multiplayer stuff or any games that require you to sign in online to play them, but you'll have something to do.

Of course, once you've completed all the games and got bored of solitaire, you can repeat tip 3.

5 Tether

If you own a reasonably recent smartphone, then you don't have to be without the internet at all. Thanks to the magic of tethering, you can simply use your phone's 3G or 4G connection to access the World Wide Web. Many phones let you set up a wi-fi hotspot, and some allow you to tether via USB or Bluetooth too.

The main problem with tethering is that most people have fairly small internet allowances on their phone contracts or PAYG deals, so it won't take you very far. If your broadband connection is going to be down for a while, you'll need to pay for premium add-ons, which can be costly (so, yes, you can cry again).

A tabloid journalist, who wished to remain anonymous, told us of the time he couldn't get on Wikipedia all morning and very nearly missed a deadline

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Component Watch

If you're not worried about being on the cutting edge, Skylake isn't the only processor game in town – and we've got the bargains to prove it!

Intel Skylake is hitting shelves, and that means the processors are as expensive as they're going to be. What about the previous generation, though? If you're not ready to part with £200-£300 for a 6000-series chip AND a new Socket 1151 motherboard, maybe there are discounts to be found in buying older hardware. With that in mind, we've researched the best prices we can find for those chips so that you can upgrade without having to empty your wallet of its contents completely.

Deal 1: Intel Core i3-4360
RRP: £119 / Deal Price: £116

The fastest Haswell Core i3 chip you can buy is the Core i3-4360, a dual-core Socket 1150 chip clocked at 3.7GHz with integrated Intel HD graphics on board. At this end of the market, Haswell is already aggressively priced and the Skylake-based competition isn't out yet to push the prices down further, so bargains aren't particularly easy to find. In fact, in many places it's more expensive to get hold of one now than it was six months ago. This deal is still a very good one.
Where to get it: Dabs (**bit.ly/1fWQWYy**)

Deal 2: Intel Core i5-4690K
RRP: £229 / Deal Price: £172

The Core i5 4690K is one of the fastest Core i5s in the Haswell range. A socket 1150 quad-core clocked at 3.5GHz, it's fast enough for virtually all non-specialist uses, and certainly a strong choice for any home system (as we have noted many, many times before in *Micro Mart*). It even has the latest onboard GPU in the shape of the Intel HD 4600 chip, which means it'll deal with pretty much all non-AAA gaming demands you may have without needing an additional GPU. If you want an even better bargain, and are not the kind of person that's going to seek to push their system, the locked version (the i5-4690) is even cheaper – but we like the overclocking ability the K suffix allows us too much to this sort of offer down.
Where to get it: Pixmania (**bit.ly/1LNd7M5**)

Deal 3: Intel Core i5-5675C
RRP: £229 / Deal Price: £213

This Broadwell chip is one of the few to hit the desktop between Haswell and Skylake, and that makes it quite desirable for people looking for a deal. A quad-core clocked at 3.1GHz, it needs a Socket 1150 board, so if you want to upgrade from Haswell without a new motherboard this is the one to look at – especially if you don't have a separate GPU, because it contains Intel's advanced on-die graphics, the Iris Pro Graphics 6200. Better still, it too is overclockable. A delight for processor nerds, if nothing else.
Where to get it: Scan (**bit.ly/1JDpDNE**)

Deal 4: Intel Core i7-4790K
RRP: £289 / Deal Price: £269

One of the first and fastest Haswell chips on the market, the Core i7-4790K is an unlocked quad-core Socket 1150 CPU running on the latest Intel architecture, and includes an HD Graphics 4600 GPU. With 4GHz clock speed and 8MB cache, it's one of the fastest you can, especially if you overclock it. Again, the 3.5GHz i7-4770K is actually priced a little higher in some places at the moment, so don't accidentally get the slower chip because it's more expensive!
Where to get it: Scan (**bit.ly/1cq4xFT**)

Deal 5: Intel Core i7 Extreme 4930K
RRP: £471 / Deal Price: £408

This high-end Ivy Bridge-E chip, the Core i7-4930K is currently available at an unbelievable discount from Novatech. It does require a socket 2011 motherboard, but if you've already got the hardware you won't find a better pricex. A six-core, 3.4GHz CPU with 12MB of cache, it's unlocked for maximum overclocking potential and an ideal choice for hardcore gamers and speed freaks of any kind. Just don't get too close without your oven gloves on!
Where to get it: Novatech (**bit.ly/1JDphX7**)

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NEWS AND VIEWS

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Overclockers Lists High-End Chassis

Premium materials make up see-through model

Overclockers UK has contacted us to let you know about its listing of the premium InWin 805 chassis. Crafted from aluminium and tempered glass, the see-through skeleton structured chassis comes in Black or Red and supports ATX, M-ATX and ITX motherboards, a front 280mm radiator and a rear 120mm radiator. One of the first cases on the market to incorporate the USB 3.1 Type-C connector which, of course, allows super-fast transfers of up to 10Gb/s, this is also a bit of a looker, as it happens.

That aforementioned see-through look gives a 270° view and, for the more serious overclockers among you, there are options for air and water cooling. A couple more fans could be mounted in the base for additional cooling if you really need it, too.

As always, you can head off to find out more about this swish case at **www.overclockers.co.uk**.

QUICK BITS... What is reported to be a leaked internal memo has done the rounds online suggesting that Office

Big changes are afoot at Instagram as the platform is now allowing users to post portrait and landscape videos and images for the first time alongside the services signature square template.

To take advantage these new aspect ratios, and promote it at the same time, Disney decided to upload a landscape-sized teaser video for the upcoming *Star Wars* flick.

In a blog post explaining the move, Instagram wrote "nearly one in five photos or videos people post aren't in the square format, and we know that it hasn't been easy to share this type of content on Instagram."

Addressing such issues as people being cut out of photos and cramped shots, giving its users more options is always going to be welcome and we can only imagine that you'll be pleased about this if you are an Instagram convert.

➤ ***This is the kind of thing you'll be able to post from now on***

Facebook Hits Over A Billion A Day

Another milestone for social networking site

Facebook's popularity continues to show no signs of abating any time soon with Mark Zuckerberg announcing that the site has reached over a billion users on a single day. Yes, one in seven people on Earth "used Facebook to connect with their friends and family" according to Zuckerberg, which is quite the achievement. He went on to write in a post on the site "This was the first time we reached this milestone, and it's just the beginning of connecting the whole world."

In other Facebook news, the company is looking at tackling video piracy with video-matching technology allowing content creators to easily check if any videos have been reposted to Facebook without permission. Having faced criticism in the past from various video creators, it's little surprise that Facebook has responded, although the tool will only be made available to a small group of partners while it's working on developing it further over time.

2016 for Windows will be released on September 22nd

For the past month or so, I've had an annoying Windows 10 problem on my main PC. I don't actually have it installed on there, though, and that's why it's a problem.

I signed up for the upgrade ages ago, because I felt duty bound to do so as a tech journo, but so far I've avoided actually taking the leap. I've been using Windows 7 happily for years, and I've seen nothing that makes me want to get rid of it just yet.

However, I still have the Windows 10 logo sitting in the taskbar of my PC, and every now and then, when I start it up, I get a reminder from Microsoft that I should upgrade. I probably would, were it not for the fact that friends of mine have told me how their upgrades resulted in persistent blue screening, and eventually ended up with them reinstalling Windows.

Admittedly, in the short time that I've used Windows 10 on my laptop, I've had no such problems, but that's a Macbook, and it's mostly booted into OS X. With my main computer, I really don't fancy the risk.

Have you taken the plunge yet? Write in and let us know.

Anthony

Editor

Meanwhile... On The Internet...

If you look down and to your right, to the bottom corner of the opposite page, you'll see an all-to-familiar tale of the errant reply to all email written large by a Reuters employee who made his all-to-easy-we-all-did-it-back-in-1999 mistake in front of the entire company of 33,000 employees. While his mistake no doubt caused an hour or so of low-key chaos, a few chortles and an temporarily overworked email server, it would seem we're okay to have a snigger at the story because no real harm was done. However, last week was punctuated by email related stories, and not all of them were so harmless.

Take for example, the story that broke regarding the Soho-based 56 Dean St. sexual health clinic (**tinyurl.com/MMnet79a**) where the names and email addresses of nigh-on 800 HIV positive patients were accidentally used in the 'CC' section of an email, rather than in 'BCC' as intended, thus revealing their health status and contact details to anyone else included in the mail. Ironically, the matter was apparently compounded by the culprit – later said to be "distraught" by their mistake (so spare a thought for them, too) – who attempted to use the Microsoft Outlook 'recall' feature (**tinyurl.com/MMnet79b**) to correct the error. Unfortunately for them, that only led to the recall request message being sent out with names and addresses in the CC section for a second time.

It's a blunder that's not only scary for those on the list (though, apparently, details of the leaked addresses have not spread beyond those on the list) but also potentially harmful to the wider community, as it feeds into a general fear of accessing such essential services. It could be potentially far more damaging for for 56 Dean St. than just a PR blunder, though. The "administrative error" had attraced the interest of the Information Commisioner's Office (**tinyurl.com/MMnet79c**), which is apparently looking into the organisation's data policies and practices in the wake of the incident.

Funny how stories can come in clusters, isn't it. However, while we're talking about errant emails, we should also bring up *The Register*'s report stating HMRC had been involved in a similar error, when – due to a "technical glitch" – it inadvertantly revealed the details of nearly 500 job applicants to their competitors for the positions in question (**tinyurl.com/MMnet79d**).

Wierdly, in a similar vein, a glitch in WH Smith's website systems apparently caused a similar data breach last week, too. It would appear that, for a while at least, whenever someone used the online contact form for the store's subscription services, the content of the message and their details were immediately forwarded to everyone on the shop's database (**tinyurl.com/MMnet79e**). Ironically, and looping back to our friend at Reuters that kicked the page off, this matter was made worse by people using the offending Contact Us form to complain about receiving the detail-filled emails in the first place (**tinyurl.com/MMnet79f**). We'd wager the ICO going to be taking a look at this one too.

And we've not even had time to mention Hilary Clinton and her private email server yet (**tinyurl.com/MMnet79g**).

It's quite jarring when something you have become familiar with suddenly changes (**tinyurl.com/MMnet79j**), so it's no surprise that Google's decision to change its iconic logo elicited a lot of reaction and debate. What it's easy to forget, though, is that even the classic serif-fonted logo has changed several times over the years (**tinyurl.com/MMnet79k**) with a subtle colour changes here, the removal of a shadow there, and then losing it's embossed texture in 2013. The original typeface was custom created by a design lecturer at Brin and Page's *alma mater*, Stanford, by the name of Ruth Kedar (**tinyurl.com/MMnet79o**), who describes her work as "her 15 minutes of fame).

Of course, in the light of the big changes that are happening within the company at the moment, plenty of people are keen to read as much as they possibly can into the change (**tinyurl.com/MMnet79l**), and attempt to interpret (**tinyurl.com/MMnet79m**) what Google's thinking was in choosing it (**tinyurl.com/MMnet79n**). However, in typical Google style, it went one better than all of them by blogging in great detail about the thought processes of its Creative Lab and Material Design team that influenced the design (**tinyurl.com/MMnet79p**).

Congratulations are due to Daniel Middleton, known to millions of *Minecraft* players as the person behind *The Diamond Minecart* YouTube channel, for parlaying his gaming chops into becoming the most popular channel on the site.

His videos were viewed a whopping 402m times in July, making him more popular viewing than Taylor Swift, the WWE and another British-origin channel, Little Baby Bum. His rise to the top of the charts also marks another success for Maker Studios (**www.makerstudios.com**), a Disney-owned, multi-channel organisation of content creators that also lists PewDiePie, fellow *Minecraft*-er Stampy and the awesome *Epic Rap Battles Of History* team on its roster of stars.

.AVWhy?

Videos For Your Eyes... Not Necessarily For Your Brain

The idea of mashups and remixes is something that very much drives video on social media and plaforms like YouTube. We're not sure, however, that we've ever seen anything quite as elaborate as this effort by Antonio Maria Da Silva, which almost seamlessly blends some of the most famous nightclub and bar dwellers in the history of cinema into nine minutes of source-spotting joy (**tinyurl.com/MMnet79q**), including a face off between two very different Al Pacinos.

Aaaaand Finally...

While Getty's image database is now free for non-commercial use (**tinyurl.com/MMnet79h**), it still wants cash if you're using it for commercial purposes; even, it would seem, if the image has become a popular meme. This was proved when German site *Get Digital* was hit up with a bill for €785 for using the 'Socially Awkward Penguin' image (**tinyurl.com/MMnet79i**), originally shot by George Mobley for *National Geographic*, and now own by Getty. Errr... Awkward.

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Caption Competition

This chap who, let's face it, we've all been at one time or another, was the subject for our caption competition in issue 1377. You didn't dissappoint.

- **Thomas Turnbull:** "I think I've got a virus, I'm looking for it now, no luck at the moment though but I'll keep digging."
- **Thomas Turnbull:** "I've fitted the air cooler to the case, now what?"
- **Frank Everett:** "Hello Helpdesk? I have this little problem."
- **John Ross Peel:** "Who said only women can multi-task?"
- **Leigh Spriggs:** "Oh, dear PC, wire you doing this to me?!"
- **Dave Ledger:** "This is the cable company. How can I help?"
- **Ian Green:** "The friendly man 'from Windows' asked if had a PC, so I said, yes I did – until about five minutes ago!"
- **John O'Connor**: "I'm right in the middle now, but I still can't find the media centre."
- **John Mason:** "Breaking news: man goes crazy looking for the Any key."

The winner, however, was Robert Wheelhouse with "They said the files were in the computer, but I can't find them anywhere", so well done to him. if you think you could have done better, though, head over to the 'Other Stuff' section of our forum (**forum.micromart.co.uk**) and say something funny (but not too rude) about the picture below – or email us via **caption@micromart.co.uk**.

Gadget Allergy Leads To Disability Grant

French case brings relief to woman

To France now, and news of a woman who has been awarded a disability grant because she has an allergy to electromagnetic radiation emitted from gadgets. For three years, Marine Richard will be claiming around €800 a month as a result of her successful court ruling and she was quoted in the press as saying that it was a "breakthrough" for people like her that are affected by electromagnetic hypersensitivity.

Her condition was so severe that she had decided to live in the French mountains to escape mobile phones and other gadgets, which is a truly drastic, life-changing, decision to have to make.

Reuters' Reply All Leads To Twitter Titter

Much mirth over honest mistake

If you've ever accidentally clicked Reply All, you may have a degree of sympathy for this tale of a Thomson Reuters employee. The chap's name is Vince and the Philippine Islands' worker accidentally sent a message to the other 33,000 workers within Reuters.

Not only did Vince do that, the problem got a whole lot worse when some of the recipients replied to him with the Reply All button, then others replied to All telling everyone else to stop replying to All...

You still with us on this one? Basically, a whole lot of people were emailing a whole lot of other people telling them to stop emailing everyone. Phew. Eventually, Twitter learned about what was going on and thus the hashtag **#ReutersReplyAllGate** was created.

Honestly, some people!

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Snippets!

10 x 75m

The corporate vice president of Marketing for Microsoft's Windows and Devices Group, Yusuf Mehdi, has tweeted an update on the status of Windows 10 stating that it has now been installed on 75 million machines since launch. He also confirmed that Cortana has been asked to tell a joke half-a-million times, and that 90,000 PC or tablet models have upgraded to Windows 10 since launch. So Windows 10, then; it's doing okay.

Autoplay Under Fire

UK MPs are asking Twitter and Facebook to consider altering the way they work after users of those services saw autoplaying clips of the murder of the US TV news crew late in August. The murderer is thought to have posted the clip online himself and, with those services set to autoplay as standard, this lead to several users seeing the shocking footage whether they wanted to or not. Obviously, that could have been hideously upsetting, and the parliamentary group of MPs said that these firms should make sure users are warned about autoplay before any content plays.

TNMOC Seeks Painting

When is a painting interesting to techies? Well, possibly when it's a portrait of the Harwell Dekatron/WITCH computer, the world's oldest-working digital computer – that The National Museum of Computing restored back in 2012 at Bletchley Park. The painting, *Portrait of a Dead WITCH*, has gone walkabout after it sold at an auction in Lincoln back in October 2014 for the princely sum of £75. It's hard to miss – it's seven feet high by nine feet wide – and its history includes a fair bit of time in Leicestershire. If you know anything, use the hashtag **#FindDeadWitchPortrait** on Twitter to talk it up.

Hannspree Throws Up Four Fresh Wearables

Smartwatches ahoy!

Hannspree has added four new models to its wearable technology range. Costing between £49 and £89, the four new smartwatches deliver a bunch of functions and designs to appeal to different people: these include heart rate monitors, music players, remote camera shutters, voice recorders and Sim support.

So, the £49 Active 24 activity tracker is for casual fitness use with main features including a heart rate sensor and monitor, calories burnt tracker and pedometer. The £59 Prime standalone smartwatch, featured here, has integrated Sim support, sound recording function and sleep pattern tracking.

The more traditional Legend watch has added smart functionality, comes with a large high-def touchscreen that is scratchproof and features a music player, smartphone pairing, barometer and altimeter. Finally, the highest-price Pulse, at £89, comes in an all-metal frame made of stainless steel and its own features include a high-end optical heart rate sensor, stopwatch, smartwatch sync and a long battery life; two days use from a single charge, apparently.

You can take a closer look at these lovelies during a visit to **www.hannspree.eu** if you like.

Facebook Messenger Reveals Own Assistant

Siri and Cortana had better watch out

A Facebook executive has announced a new service with the simple name, M. What's interesting is that M is a "personal digital assistant" that will be housed within the firm's Messenger app that "completes tasks and finds information on your behalf".

M will apparently be able to purchase items, have gifts delivered to contacts, book restaurants, appointments etc. on your behalf thanks to a powerful AI that will be "trained and supervised by people". That means, at least according to media reports, real people will be on hand to deal with particularly complex tasks until M can adapt to handling them itself.

M's development is in the relatively early stages, with testing taking across the pond, but plans are afoot to scale it up for a wider audience. Presumably, the service is very much like Siri and Cortana, although the promise of it completing tasks would seem to suggest that Facebook is driving for something a little different. There's little clue as to when this will be rolled to consumers, but we'll be keeping an intrigued eye on this one.

QUICK BITS... The Performing Rights Society for Music is taking SoundCloud to court over unpaid

AP Accuses FBI Over Fake News

Lawsuit filed over FBI action

The Associated Press (AP) has set about legal action over the FBI's tactic of using a fake news story in order to catch a crook. The legal action references an incident in 2007 when the Bureau created an entirely fake news story with the headline 'Bomb threat at high school downplayed by local police department' in order to lure out a MySpace user who had made such bomb threats towards a school in Washington State. A link to the story, which appeared to bring up a genuine AP web page, was sent to the suspect's Myspace page by an FBI employee. The spoof page, however, contained spyware allowing the FBI to carry on surveillance on the suspect's PC.

The AP isn't happy as it feels that the FBI's actions and use of its brand in what was essentially a spear phishing attack has undermined and damaged its credibility as a news agency.

Atari Games Sell For Thousands

It's the story that just keeps on giving

We're fairly sure that, by now you will know the story of the Atari game cartridges buried in the New Mexico desert, not least because of the Xbox documentary on the matter, *Atari: Game Over*. If you don't, we'd highly recommend you check it out.

Collectively, 881 of the recovered cartridges made the princely sum of £70,000, thanks to a bunch of eBay sales, one of which saw a single *E.T.* cartridge go for over $1,500. Much of that money is going to be invested back into the city in which the cartridges were found – the fantastically-named Alamogordo – and there are still more cartridges from the find to be sold, by all accounts. So, it appears this long-standing story could have more legs in it yet.

HTC Headset Delayed

VR model coming next year, mainly

Remember the HTC Vive virtual reality headset? Remember that it was due to be released by the HTC-Valve partnership later this year? Well now it's not. Not really, anyway. A limited quantity of headsets will in fact be shipped this year but, in the main, the bulk of them will be shipping in early 2016.

A potential problem with that is that Project Morpheus and the Oculus Rift are also due for release in the first quarter of next year, so in failing to get their device out first, Valve and HTC are running a bit of a risk of being swamped. How this will impact on sales of the headset is hard to know, but we can't imagine that the partnership has done itself any favours by failing to live up to the intially ambitious launch date.

Contactless Limit Increased

Buy things PIN-less for a tenner more

As more and more of us are using contactless transactions in the UK, it makes sense that the spending limit should be upped. Indeed, you can now spend up to £30 in a contactless transaction, up by ten pounds on the previous £20 limit. The UK Cards Association organisation behind the card payments industry said that contactless payments accounted for £2.5bn for the first half of the year, which is more than the £2.32bn contactless spend in the whole of last year.

royalties, stating that the streaming site needs a music licence to operate in Europe and the UK

ViewSonic VG2860MHL-4K

Can Viewsonic deliver the perfect 4K display for Mark?

DETAILS
- **Price: £437 (LambdaTek)**
- **Manufacturer: ViewSonic**
- **Website: www.ViewSonicEurope.com**
- **Requirements: PC or mobile system with DVI, HDMI or DisplayPort outputs**

I'm increasingly feeling like Golidlocks at a porridge testing event regarding ViewSonic's 4K displays. First I covered the very expensive VP2780-4k, and found it didn't support 60Hz at full resolution. Next up was the VX2475SMHL-4K which, at 24", was too small for the higher resolution to be really appreciated.

Now the VG2860MHL-4K has arrived, being both a decent size (28"), a competitive price (sub-£450), and offering 4K resolution at 60Hz. So, could this be the one that's *just right*? Well, on paper the design does appear to address many of the issues that bugged those earlier 4K monitors.

It's 300cd/m^2 backlight is sufficiently bright, while the contrast ratio is decent and it claims a response time of just 2ms. That last figure reveals that this isn't an IPS technology screen, and it achieves that response by using a TN film based model that can sadly only manage 170°/160° of viewing angle. If you're not moving around all the time, though, that's acceptable, but it's something you need to consider if you do.

Where this screen really pulls out the stops is in its colour gamut representation, with 96% of the sRGB range available to be viewed. Technically ViewSonic do make a few screens with even greater sRGB coverage, but the 10-bit colour processing in this is not rubbish by any gauge.

This design is also very strong on connectivity, having DisplayPort 1.2a, Mini DisplayPort 1.2a, MHL 2.0, HDMI1.4a, and a DVI connector. I'm still bemused by monitor makers' obsession with MHL, given the handful of times I've ever connected my phone to a screen, but someone must do it. There is also a really useful USB 3.0 hub with four ports downstream, divided into two each of USB 2.0 and USB 3.0.

ViewSonic also include some predictably limited 3W dual speakers, for those who haven't got room for anything better. However, when you factor in the really nice tilt and swivel stand, the package hints that the target audience here is stock traders and accountants, desperate to see more rows and columns than ever before rather than those looking to max out their home entertainment or gaming system.

Backing up that hypothesis, ViewSonic also gave this screen some neat multi-picture support, allowing up to four computers to be represented simultaneously, and including both PIP (picture-in-picture) and PBP (picture-by-picture) modes.

Gamers are already going to need a monstrous GPU to drive a screen this big at 60fps, so having a display that can refresh quicker than that is rather pointless. While professionals working with colour are likely to pass this design by, because the TN technology in it just isn't consistent enough for colour matching, if you simply want a desktop the size of Kanye West's ego, this is the model for you. Just don't expect it to be a flexible solution you can use in a wide range of situations.

If I've got a real complaint about his design it's that it's not quite as cutting edge as I might have hoped. This product should really come with DisplayPort 1.3 and HDMI 2.0; the lack of that latter standard means that it can only hit the 60Hz refresh rate when connected via DisplayPort.

With that thought in mind, I will now wait for a fourth bowl of oaty goodness; metaphorically speaking.

mm Mark Pickavance

Key Features
- **Ultra HD 3840 x 2160 @60Hz, 10-bit colour and 96% sRGB coverage**
- **MultiPicture support PIP, PBP, equally split-screen up to four video sources for multitasking**
- **DisplayPort, Mini DisplayPort, HDMI, MHL, DVI, 4 USB ports and dual speakers**
- **2ms fast response time for super smooth images**
- **Thin client mountable VESA stand with tilt, swivel, pivot and height adjustment**

A big screen at a reasonable price, but only for business users

VariDesk Pro Plus 36

Stand up, and improve your health

EDITOR'S CHOICE micro mart

DETAILS
- Price: £350
- Manufacturer: VariDesk
- Website: goo.gl/HZYgm8
- Requirements: Comes fully assembled, but can be quite heavy to lift onto an existing desk

When fully extended, the VariDesk Pro Plus 36 makes for an excellent standing desk

In its flat position, it's still an excellent riser for your monitors

The health benefits of standing while working, instead of sitting, are well documented. Not everyone can afford to fork out the £600-plus some height adjustable desks cost, though.. Thankfully, VariDesk may have a solution at hand.

The VariDesk Pro Plus 36 is quite an ingenious idea, as it's actually a riser unit that stands on an existing desk, and allows the user to move from a sitting position to standing in a matter of seconds. The unit is made up of a solid plastic desktop that measures 914mm in length and 685mm deep, with a slide out keyboard and mouse section that is 330mm deep. The top is enough to fit a couple of decent 24" monitors side-by-side in a dual-screen setup, and the keyboard section will house a standard, office-centric keyboard and mouse combination well enough; though some of the more elaborate gaming sets may be a bit of a tight fit.

The genius part of this setup is revealed when you grasp the two handles either side of the desktop. This activates a spring-loaded pneumatic mechanism that gently raises the desktop section to a point 447mm off the desk, and slightly forward too for improved ergonomics. So, when placed on an average height work desk (around 700mm), the height of the monitor desktop shelf can be raised to 1110mm. The keyboard and mouse section rises to 355mm above it's mounting surface, but when flat, the entire unit adds just 107mm to the height of the monitor placement.

The movement is extremely smooth, with a spring-assisted lift mechanism that makes extending and retracting the VariDesk to and from its positions very easy. There's plenty of room available for the average PC keyboard, mouse, monitor setup, weighing up to 15kg, and since this is sat on a desk already, there's still ample room for paperwork.

The weight of the VariDesk may seem a little unwieldy at first. Getting the 23Kg of the Pro Plus 36 onto an existing desktop can be achieved by a single person, but we'd recommend employing an extra pair of hands if you can for safety's sake.

The only gripe we have with the VariDesk Pro Plus 36 is that the keyboard and mouse section has too small an area for the mouse to move sufficiently for our taste. It's may be workable enough if you're moving across a single screen, but if you use a dual monitor setup or you're planning on doing a spot of stand up gaming, then the lack of mouse space soon becomes a noticeable problem.

However, the Pro Plus 36 is an exceptionally well-constructed riser unit made from superior quality components and built to last. For £350 it's certainly a lot cheaper than a brand new, dedicate height-adjustable desk. Indeed, in some ways it feels a lot more ergonomic than a simple, flat desktop.

If you're looking for a healthy alternative to sitting, and you don't want to get rid of your current desk setup, then the VariDesk Pro Plus 36 could be an ideal solution.

mm David Hayward

An excellent solution for standing while working

Specifications And Features

- Work surface size: 914mm x 685mm (keyboard tray and desk)
- Holds up to 15kg of weight
- Product Weight – 23kg
- Product dimensions (flat): 107 x 914 x 679mm
- Product dimensions (extended): 447 x 914 x 99mm
- Desktop max extension height: 457mm
- Keyboard max extension height: 355mm
- Free companion app gives you sit and stand alerts
- Switches from sitting to standing position in just three seconds
- Ergonomic design adjusts to any user's height
- Fits most desks in any office or cube
- Spring-assisted lift
- Fully assembled; easy set-up

micro mart
Quality 9
Value 8
Overall 9

VTX3D R9 285 2GB

A new brand name can't disguise some familiar traits

DETAILS
- **Price: £130**
- **Manufacturer: TUL Corporation (VTX3D)**
- **Website: www.tul.com.tw**
- **Requirements: Windows XP/ Vista/7/8/10, 500 watt PSU, PCI-E 3.0 x16 slot**

Until this review, VTX3D wasn't a brand I'd encountered. It is, however, one that is owned by the TUL Corporation of PowerColor fame. Why they need a different name in the European and Asian market I've no idea, but the name seems to be as far as the changes go, as the VTX3D R9 285 seems to embody many of the traits I'd expect given this heritage. Specifically: it's not the quickest video card ever made, but remarkable value for money all the same.

AMD launched the R9 285 reference cards back in September last year, making the technology in this card at least a year old. However, of the entire 200 series, this is the only card that uses Graphic Core Next (GCN) 1.2, where all the others either don't use that architecture, or use GCN 1.0/1.1. The GPU was used in the Tonga PRO, the same one found on the R9 380, now renamed 'Antigua'. It has no less than five billion transistors that are organised into whopping 1792 stream processors, 112 Texture mapping units (TMUs) and 32 Render Output Units (ROPs).

So, unless you've got some insane task for it to perform, that's plenty of GPU power. However, to marshal all that video horsepower effectively the card also needs lots of memory bandwidth, and the R9 285 has a 256-bit wide pathway and 2GB of GDDR5 to provide 176GB/s. This relatively limited memory spec divides this design from the very high-end 200 series, which provide 512-bit wide paths, but it's still a dramatic amount of bandwidth to service the GPU.

The reference R9 285 core and memory clocks are 918MHz and 1375MHz respectively, and the VTX3D version modestly boosts the core to 945MHz and leaves the memory speed unchanged. You can tweak these up higher, if you're feeling brave, but stability will eventually be compromised at some point.

VTX3D did give this design two 80mm fans, blowing across a heat sink, and how fast they rotate is controlled by a board mounted thermostat. These can get clearly audible if you stress the card out with a benchmark, but generally it's pretty quiet when challenged with most games.

The other aspect of this design you need to be made aware of is the outputs. With this much power available to you, thoughts may naturally drift to multi-display gaming, and the card comes with single DVI-I, DVI-D, HDMI and DisplayPort connections enabling four monitors to be connected merely by cables. If you've got a DisplayPort hub, that could go up to six, though for gaming most people typically use three.

As this is a DX12 compliant design, I chose to test it under Windows 10 on my trusty LGA 2011 test system, where I pitched it against its R9 290

Specifications
Graphics Engine: R9 285
Video Memory: 2GB GDDR5
Stream Processor: 1792 Units
Engine Clock: 945MHz
Memory Clock: 1375MHz (5.5Gbps)
Memory Interface: 256bit
Bus Standard: PCI-E 3.0
Cooler: 2 slot Fan sink
Power Connector: Two 6-pin PCI Express Power Connector
Crossfire Support: Yes
OpenGL: 4.3
DirectX Support: DX12
Minimum System Power Requirement: 500W
Display Connectors: DL DVI-I, DL DVI-D, HDMI, DisplayPort

big brother and a modern Nvidia equivalent, in the form of the GTX 950. The results show that this card equal to about 70% of its high-end R9 sibling, though depending on the resolution you're running, there could be much less of a noticable difference when it comes to playing a game. It's a good 10% quicker than the GTX 950, however, and even manages to edge out the GTX 960 above that.

What I've also started to do when benchmarking video cards is to run 3DMark's API Overhead test, to get a handle on potential DX12 performance. Where the Nvidia cards perform better on processing DX11 calls, the architecture of AMD's R9 285 is superior at DX12, achieving a very healthy 16.7 million API calls per second. That compares with 14.8m on the Zotac GTX 950 AMP!

When you consider what this it costs, those are pretty amazing numbers, and mark out this card as a true bargain. If it has any sort of design weakness, though, it's the requirement for dual six-pin PCI-E power lines. Despite this, TDP is just 190 watts, at least 35W less than the R9 280 it evolved from, and the R9 380 that has arrived to replace it. If AMD could only manage to fabricate this GPU using a 22nm process, and reduce that down to less than 150 watts, it would only need one PCI-E line and all would be a little better with the world.

However, with nearly as many Teraflops on offer as the R9 280 at much lower power consumption, this card seems to have the almost ideal mix of features. The only caveat to that high praise is that VTX3D have already discontinued it, presumably in favour of the R9 380. So if you want one at this price, I'd hunt for it while they're still available

VTX3D is clearly a name to watch in the future, though, if you like your video cards both cheap and blindingly fast – just like this one.

mm Mark Pickavance

Decent last-gen AMD GPU technology that keeps on giving

BenQ W1350 Projector

Fancy some big screen projection?

DETAILS
- **Price: ~£750**
- **Manufacturer: BenQ**
- **Website: goo.gl/W6lkeP**
- **Requirements: HDMI source, more 3D glasses (only one in the box), VGA source, component/composite video source**

The BenQ W1350 is a relatively compact home projector

Projectors have become a more established technology within living rooms over these last few years, as we've seen from some of the examples we've reviewed in the past. What's more, some offer far better audio and visual technology than the business models that most of us are probably more familiar with.

The BenQ W1350 Projector is a prime example of one such living room, home entertainment projector. This reasonably compact DLP projector has some interesting features, such as a native resolution of 1920 x 1080, a contrast ratio of 1000:1, 2500 ANSI lumens, and 3D playback – with a single pair of active 3D glasses included in the box.

The 260W lamp is rated with a lifespan of around 2000 hours under normal operation, there are other eco modes that further extend its life to 3500 and 4000 hours, though. Lamp replacement is relatively easy, a 10-step process that's thankfully detailed with diagrams in the manual.

Connectivity is good on the W1350, with a pair of HDMI ports (of which one is MHL labelled) VGA, and component video. There are also two USB ports (type-A and type-B) an RS232 port, composite video, and stereo audio input.

The W1350 includes a fairly good set of 10W speakers built-in to the chassis itself. Most projector speakers tend to be worse than the built-in speakers on a monitor or TV, however, by using a resonant chamber, the W1350 actually manages to reproduce a decent level of bass along with a powerful audio performance. Naturally it won't replace your dedicated soundbar and sub any time soon, but for the sake of less cabling it does an okay job.

Finally, and speaking of a lack of cabling, the W1350 has on offer an optional HD wireless kit, that will give you the ability to stream content from a single source to the projector up to thirty, line of sight, metres away. The projector has four antennas within the chassis, so there's a pretty good chance that the signal can be received without interruption through the thin wooden doors of an AV cabinet. Unfortunately, we were unable to test this theory in this instance.

Setting up the W1350 was certainly easy enough, and when connected via HDMI the image quality was really quite good. The 100" screen size, projected from a mere three meters away was remarkably sharp; probably on a par with a Philips Screeneo. The sound was okay too, although it did feel a little disjointed being positioned to one side and to the back of where the screen was being displayed. A quick switch to a surround sound setup soon fixed that issue. The only major issue we had was a rather poor 3D image, which didn't project any real depth and seemed either a little too washed out or over saturated with red. Motion in 3D didn't seem right as well, there was some ghosting effect, which induced a seasickness feeling from those watching.

Lastly, the noise levels were a little more than what we had hoped for. There's not a huge amount you can do about ambient noise when using a projector, other than to turn up the volume of what you're watching, but we've had quieter models in the past.

Nevertheless, the BenQ W1350 is a reasonabe projector. The HD picture is good, clear and sharp enough despite the poor 3D image. Perhaps it was just that the model we had has done the review rounds and is now starting to show some wear and tear. For a home prohector, though, this is not bad.

mm David Hayward

An decent projector, with a clear and sharp image

Transcend 1TB SSD370s

A higher-capacity SSD makes all the difference

DETAILS
- **Price: £280**
- **Manufacturer: Transcend**
- **Website: goo.gl/IksQFd**
- **Requirements: SATA III 6Gb/s connection for best results, Windows 7+ for Transcend software**

The Transcend 1TB SSD370s is certainly a decent looking drive...

But it's the 1TB of storage that's the icing on the cake

Transcend released its 370 range of SSDs last year to much acclaim. These drives came in a variety of sizes, from 32GB through 64GB, 128GB, 256GB, 512GB, and the model we have on test today, an impressive 1TB of storage.

The SSD370s measures a standard 100 x 69.8 x 6.8mm and weighs 58g. Naturally this means it's small and light enough to fit into the tiniest of media centre cases, laptops, or other ultra-small form factor devices without too much trouble. Fitting into a standard desktop case, though, is helped by the addition of a 3.5" bracket that's included in the box.

The drive itself moves away from the usual Transcend SSD colour scheme of all black with red and white labelling, and instead has a tasty steel effect to the plastic casing. The 3.5" bracket, however, remains a solid black from the previous SSD370, with the Transcend logo printed to one side.

The drive may well be as light as a feather, but it's by no means flimsy. That said, it's probably not going to be the drive of choice for an external SATA to USB setup. Inside a machine, though, and left alone once fitted, it's more than perfect for the job.

Transcend have helped alleviate the reliability issues most SSDs suffer from by including an advanced wear-levelling system and Error Correction Code. This improves the lifespan of the drive and helps reduce any errors that may occur when transferring data. This feature also works hand in hand with the accompanying Transcend software, SSD Scope.

> **"1TB is a good amount for a single drive solution, and ideal for laptops"**

The software offers an interface to help transfer the existing system and data to the new drive, check the health of the installed SSD, update the firmware, enable TRIM support, securely erase the drive and provide numerous details and specification to help you get the most from the newly fitted SSD.

We fitted the drive to a Gigabyte Z97M-DS3H motherboard, with an i7-4790k at 4GHz and 16GB of memory installed together with a copy of Windows 10. With AATO Disk Benchmark we measured an impressive read speed of 560MB/s on the 8192KB file size, along with a reasonable 325MB/s write speed. Of course the main draw is the large amount of storage on offer. 1TB is a good amount for a single drive solution, ideal for laptops or small media centre-type setups.

Windows 10 booted up in just under nine seconds, and Linux was booted, up and running in less time than it takes to get out of our chair. So, as you can well imagine, the entire system performance was greatly improved beyond any other upgrade we've attempted before on this particular motherboard.

We were pretty impressed with the Transcend SSD37s. The 1TB model we used was more than enough capacity for the OS, programs and several top title Steam games. The performance benefits were incredible and we were suitably happy with the Transcend software; it was very useful, although in all honesty you can use your drive without ever having to install it.

This is an excellent drive with ample space and speed. For those reasons It will be of an advantage to any desktop, laptop or media centre solution.

mm David Hayward

Plenty of storage for the price

Panda Internet Security 2016

With Windows 10 compatibility, this updated security software from Panda aims to keep your PC safe. Roland Waddilove takes it for a test drive

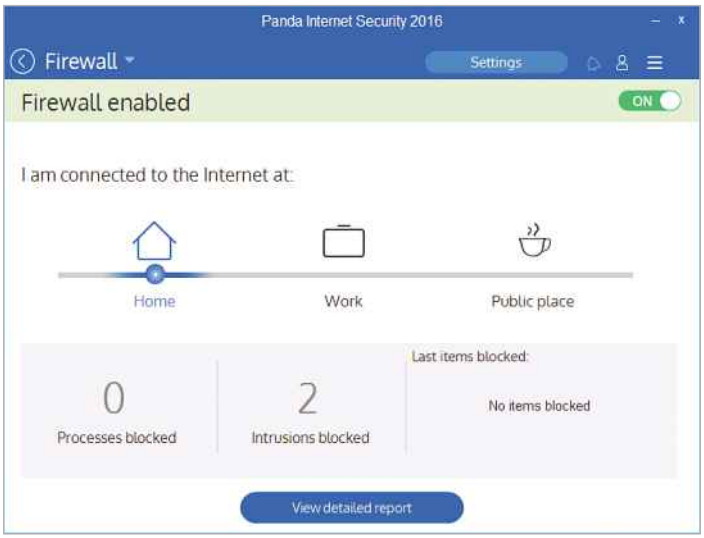
DETAILS
- **Price: £45**
- **Manufacturer: Panda Security**
- **Website: www.pandasecurity.com**
- **Requirements: Windows XP or later, 1GB RAM, 1GHz processor, 240MB disk space**

Malware software is under constant development and new variants appear daily, which is a problem if you have old security software. To combat the latest malware Panda Security looks to update its software range every year with newer and better threat detection and security features. Internet Security, reviewed here, is one step up from the base package, Antivirus Pro and costs just £9 more. This, it strikes us, makes it the best value for money package in Panda's range.

The most obvious change in the software is the completely new interface. The old one had bright and colourful tiles, which was reminiscent of Windows 8. Internet Security 2016 is much plainer; mainly white and blue. There are still tiles, but they are simpler and can be rearranged into any order you like by dragging and dropping.

These provide access to the elements of the program, showing status and malware detected, scanning options for the drives, and several monitors and shields. They also show the current on/off status of each module and sometimes other information like the number of processes, the wi-fi network you are connected to and number of devices on the network.

The software has a brand new look that fits in with Windows 10's design



Many modules have a simple interface, but advanced settings are still accessible

An Application Control module determines what programs on your computer are allowed to run and, when unknown applications are detected, you are asked whether to allow or block them. Programs can also manually be added to a list and set as allowed or blocked. It recognises a lot of software and you are rarely bothered with pop-ups asking what to do.

A firewall is part of Internet Security and in its default settings it ran silently in the background without pop-ups asking whether an application should be permitted internet access. You can view the programs that access the internet and revoke or allow access manually, modify the rules and so on, but it seems to work well enough when left to itself. There is wi-fi protection and you are notified when connecting to networks with security problems. You can also see a list of devices connected to the network, so you can check that no-one is connecting without your knowledge. A Safe Browsing module checks website URLs that are accessed and even processes running in the background are monitored too.

A Data Shield module protects folders that contain your files and blocks programs that do not have permission to access them, so any ransomware that tries to encrypt your files and lock you out will be blocked. USB protection prevents malicious programs on USB flash memory drives from executing automatically. There are parental controls, if the computer is a child's, and a bootable USB flash memory drive can be created to start the PC and clean up malware infections.

Panda security products rate very highly in real-world protection tests by companies like AV Comparatives and AV-Test, and they get perfect or very nearly perfect scores. It is currently one of the best security suites and is recommended.

mm **Roland Waddilove**

Excellent protection from malware combined with a simple interface

TomTom Start 60

Our reviewer lets technology guide him on the road

DETAILS
- **Price: £110**
- **Manufacturer: TomTom**
- **Website: www.tomtom.com**
- **Requirements: n.a.**

Once somewhat synonymous with satnav devices, TomTom is one of the innovators responsible for turning this technology into an everyday product that many people have used regularly for a good few years now. The Start 60 is entering a different world to its early ancestors, though. A world where many of its features are also integral to smartphones. As such, this model comes with the promise of free map updates for the life of the device in an attempt to convince consumers to buy a dedicated product rather than relying on a more dynamic online service like Google Maps Navigation.

The Start 60, with dimensions of 16.99 x 10.48 x 2.22cm (W x H x D), provides both visual output and the users means of interaction via the 6" (15cm) resistive touchscreen. It's aspect ratio of 16:9 delivers resolution of 800 x 480 pixels for the 2D and 3D views available with the device. When fully charged, its battery should give you two hours of use if the car lighter socket (for which a charging lead is provided) is otherwise occupied – or perhaps if you want to use the satnav device away from the car when visiting a new area on foot.

There's a micro-SD card slot located on the base of the unit. This feature can be used for accessing updated maps downloaded to a computer and stored on a card if it's not practical to plug the unit itself in via USB. No card is provided for this purpose, however.

As you would expect, the Start 60 can provide routes that are designated as fastest, shortest or most eco-friendly based on your preferences. It can help you plan routes that avoid toll roads and/or motorways too. Generally, these are calculated quickly; they can be displayed in either 2D or 3D mode, depending on which you find most useful as a driving aid. Directions and other navigation advice, including street names, will be provided as you drive along the route. However, as I like to listen to music while driving I had to increase the volume of the voice providing the instructions. Its interventions, though, are timely, clear and helpful.

As part of its mapping feature, this TomTom device can provide points of interest details. It can even display the location of parking areas, petrol stations and restaurants etc. Whether you want to hand over your culinery future to a satnav device, however, is completely up to you.

The Start 60 allows you to access its various features and settings via a couple of horizontal menu layouts, which means you need to scroll left or right to locate some features. While this is no great handicap, it does reveal that the screen is not the quickest to respond to user interaction, which can be a little frustrating.

Indeed, it's a shortfall that highlights the quandry that TomTom faces in a smartphone-driven world: it can't charge premium prices and provide cutting edge tech to compete in terms of look and feel, whereas low-priced hardware highlights the deficiencies of a standalone solution. If you're a 'one tool for one job' type, a satnav will still serve just as effectively as it always has. For many, though, the 'do-it-all' nature of the devices already in their pocket is becoming ever more tempting.

mm Michael Fereday

> **"The screen's not the quickest to respond, which can be a little frustrating"**

Not that responsive, but an effective satnav anyway

GROUP TEST

4K Monitors

Years ago, we would have conducted a group test on CGA monitors, and through the years that group would have moved on to VGA, SVGA, WXGA, HD and now 4K.

4K is the darling of the viewing world at present, the key resolution that we're being persuaded to use hence forth – until 8K or 12K becomes the new kid on the block.

David Hayward checks out six 4K screens to see what they have to offer.

Acer CB280HK

DETAILS
- **Price: £290**
- **Manufacturer: Acer**
- **Website: goo.gl/qzkzcd**
- **Requirements: GPU capable of displaying up to 4K resolutions**

Acer was, surprisingly, one of the first monitor manufacturers to leap into the whole 4K on your desktop thing with both feet. Although the Acer CB280HK is a first-generation model, it's still available to buy and can still hold its own in an overcrowded market.

The Acer CB280HK is a 28" twisted nematic film panel, LED, 4K monitor capable of displaying resolutions up to 3840 x 2160. If that wasn't enough to pique your interest, then the 1ms response time, 100,000,000:1 contrast ratio, DVI, HDMI, DisplayPort and mini DisplayPort may tantalise you even further.

It's surprisingly ergonomic too, with adjustable height and tilt angles, plus there's an MHL (Mobile High Definition Link) on one of the connections, so you can hook up your phone and enjoy the new generation office-in-your-pocket – of course, with the added bonus of having a large ultra-HD screen.

The quality throughout is generally good. The relatively large bezel was a little off-putting to begin with, but that soon became a background annoyance, which was gradually ignored the more we used it. The base, however, didn't feel all that good. Naturally it did the job it was designed for well enough, but it did feel a little flimsy and perhaps a little too plastic if we're going to be pedantic. Saying that, though, there were no creaks and cracks and sounds of plastic under great stress as we moved the screen around its tilt and height adjustments.

The Acer CB280HK is a cheap 4K monitor, but that doesn't make it the best buy

Although good, we've seen a better quality image on other models

As you would expect, the screen quality is the element that will ultimately draw in the crowd. 4K may well often be blasted as an unnecessary technology, but once you've experienced true 4K viewing and gaming, you can begin to appreciate just how amazing it really looks. Sadly, though, we found the Acer CB280HK a little washed out in that department.

The colours were good, probably better than anything we've viewed in 1080 HD. But when next to the other 4K monitors we've had on test, this Acer just didn't quite hit the mark. That's not to say the clarity and sharpness of the screen was poor, it's just that it wasn't as good as the other monitors we've used this week.

If, though, this is the only 4K monitor you've come across and you've upgraded from a 1080 HD variety, then you'll love the extra spectacle this monitor will offer. Other than that, and if you're used to what 4K can offer in terms of the depth of the colours, the contrast between the blacks and greys, the stark, sharpness of the image, then you'll find the Acer somewhat lacking.

While the Acer CB280HK isn't the best 4K monitor we've ever had the privilege of testing, it's okay and will certainly suffice for a newcomer to the 4K display world. The bonus points of course go the pricing, which at around £290 isn't too bad. However, for a few pounds more you'll get a significantly better product.

AOC U2868PQU

DETAILS
- **Price: £295**
- **Manufacturer: AOC**
- **Website: goo.gl/at3158**
- **Requirements: GPU capable of displaying 4K resolutions, DisplayPort cable needed (only comes supplied with HDMI)**

▲ *The AOC U2868PQU is a surprisingly good monitor for the price*

▲ *It may lack the build aesthetics of higher price models, but the screen quality is great*

AOC shares many similarities with Acer. Generally, both companies offer excellent value for money while still adopting the latest technologies, and there's roughly the same level of quality, to some degree.

The AOC U2868PQU therefore was expected to be much the same as the Acer CB280HK: good, but not the best 4K, decently built, but then not quite as high a quality as you'd expect from a more expensive solution. Happily, though, we were quite wrong.

The AOC U2868PQU is a 28" TN panel, with 3840 x 2160 resolutions, at a smooth 60Hz and with a 1ms response time. It's from the Pro-Line range of AOC monitors, so there's an inherent business-like range of ergonomics already incorporated into it.

This of course means that there are height adjustment, pivot and swivel features to help you get that perfect position, and there are four USB ports, two of which are USB 3.0 and fast charge enabled, set up in a side-accessed hub on the panel itself.

Connectivity comes in the form of HDMI, DVI, VGA and DisplayPort, with MHL over the HDMI port to mirror mobile content. There's a set of 3W speakers built into the monitor, which although a little too tinny for the avid audiophile, aren't all that bad.

Build quality is excellent. Whatever concerns we had about the quality being roughly the same as the Acer model were soon put to rest. The base, stand and panel are all well constructed, with the ergonomics making it easy to manoeuvre the screen while still keeping it stable.

The base contrast ratio is 1000:1. In this case the dynamic ratio hits a decent 80,000,000:1, which is enough to produce a high level of detail in both brighter and darker images. The colours, sharpness and clarity are all exceptional and really prove that 4K is quite the impressive beast that the high street electrical sales people harp on about.

> **"Has a range of useful real-world features and is soundly constructed too"**

Our gaming tests left us with a very good impression, as did the UHD 4K content, and even the normal day to day office duties. The built-in speakers helped too, and although they're not as good as a decent desktop setup, they did a better than average job of belting out the throaty roar of a Spitfire in our gaming test.

We were quite impressed with the AOC U2868PQU. It's a very good 4K monitor that's nicely designed, has a range of useful real-world features and is soundly constructed too. The price isn't too bad either, at around £295, which is only on average a fiver more than the Acer model. As with most models, though, you could probably find a cheaper version somewhere on the internet.

Looking at the Acer and the AOC model, side by side, we'd probably opt for this.

BenQ BL2711U

DETAILS
- Price: £500
- Manufacturer: BenQ
- Website: goo.gl/dIBQBX
- Requirements: GPU capable of 4K resolutions, HDMI cable only in the packaging

We recently had this BenQ monitor in for an individual test, but since it's a 4K screen, we thought it'd worth putting it through its paces against other monitors of this ilk.

The BenQ BL2711U is a professional CAD, 27" UHD IPS LED panel with an abundance of features for those who demand the highest possible quality when producing their work. It can easily handle 4K resolutions up to 3840 x 2160, and thanks to the AHVA (Advanced Hyper-Viewing Angle) panel, you'll get excellent 178° viewing angles and extraordinary colour and clarity through the use of 100% sRGB and Ultra-Vivid technologies.

Native contrast is 1000:1, with a dynamic contract of 20,000,000:1; and you get the same BenQ Flicker-Free Technology and low Blue-Light modes as from the gaming range of monitors. There's also the ten-level brightness adjustment present, again from the gaming world, which can reveal a lot more detail in darker areas.

There's an ambient light sensor located under the panel in the centre of the bottom bezel to auto-adjust the brightness of the backlight and an Eco-Sensor that will auto-reduce the brightness if it senses that there's no user in front of the screen. Furthermore, there's PiP (picture in picture) and PbP (picture by picture) modes, as well as a range of presets that offer the best possible displays for CAD/CAM, animation, photo and video editing and the aforementioned Low Blue Light mode.

The BenQ BL2711U is certainly a very capable 4K monitor

Connectivity is good too, with a pair of HDMI ports (1.4 and 2.0 ports), DVI-D and DisplayPort. There's also a USB 3.0 hub with two ports on the underside of the screen around the back and a further two USB 3.0 ports located on the side of the screen. There's a good-sized cable tidy hole on the stand and a headphone stand that pokes out of the back.

With this being a professional pitched monitor, the ergonomics are generally better than what we've already looked at from the Acer and AOC models. The BL2711U has a 90° pivot, -5° to +20° tilt, 45° swivel and is height adjustable to 140mm, with a maximum distance of 150mm from the bottom of the screen to the base. Interestingly, with the Display Pilot Software installed, the display will auto-pivot when the physical screen is moved for the best view when either landscape or portrait.

> **"The clarity and sharpness of the screen is by far some of the best we've ever seen"**

Simply put, the quality of the display is magnificent. The range of colours, clarity and sharpness of the screen is by far some of the best we've ever seen. Naturally, the 4K resolutions help with the quality of the display, but there's a deeper colour range here than we've experienced so far.

However, it's rather expensive

First and foremost, though, it's a professional model, so it's fairly natural that the pricing structure is slightly different. As it stands, the BenQ BL2711U costs in the region of £500, but what you get in return is a fantastic monitor. However, it's not too far from costing twice as much as the Acer and AOC.

In the end, it all depends on what you want from a 4K monitor: amazing quality and a more professional and ergonomic approach or something that's slightly cheaper but still sufficient?

Dell UP2414Q

DETAILS
- Price:£470
- Manufacturer: Dell
- Website: goo.gl/DGyxa8
- Requirements: GPU capable of handling 4K resolutions, both HDMI and DisplayPorts cables needed as nothing supplied

The familiar sight of a Dell monitor

Considering the amount you're paying, you don't get a very good monitor in return

Dell was one of the first companies to launch a 4K monitor on to the eager public, with the UP2414Q. In terms of monitor technology, this example is getting a bit long in the tooth, since it was released nearly two years ago and in that time it's had a couple of updates and revisions before handing the baton over to the more feature-rich 32" UP3214Q.

The Dell UP2414Q is a 23.8" IPS LCD panel, with a maximum resolution of 3840 x 2160 and 8ms response time. The typical contrast ratio is 1000:1, with a dynamic ratio of just 2,000,000:1, which seems rather small for a 4K screen.

What it may lack in contrast numbers, though, it makes up for in connectivity. There's HDMI, mini DisplayPort and DisplayPort (full sized), with a four-port USB 3.0 hub (one port is fast charge enabled) and an SD card reader tucked away near the power port.

An odd design decision is that the HDMI port is only version 1.4, not the usual 2.0. This means of course that you'll only be able to achieve UHD 4K resolutions via the HDMI port at 30Hz, instead of the usual 60Hz that most 4K monitors offer.

As this model is from the more business line of Dell monitors, there's a good set of ergonomic features, with tilt, height adjust and pivot. Moving the monitor around its angles and heights proved to be perfectly fine, as did the rest of the construction of the bezel, stand and panel.

Dell has a particular formula for how a monitor looks, and it's sticking to it. This means that the UP2414Q looks pretty much like every other Dell business monitor going, which also means that the same design problems apply. For example, why does it insist on positioning the ports, including the USB hub ports, in reverse and up and under the bottom of the panel. This makes it extremely awkward to plug in or unplug anything, as you're required to pull the screen to one side and tilt it to see where you're going. If you have a few cables plugged in and the power is limited by the desk and the one opposite, as in most offices, then things can get a little fraught.

As for the image quality, we weren't all that impressed. The 4K resolution looked great as a static image, but with moving images (games, movies, 4K YouTube clips and so on), there was a serious amount of lag, and the screen suffered greatly as a result. We also noticed significant screen tearing and some pixelation around the edges of the image – something we didn't come across with the other monitors. And there seemed to be some pretty terrible backlight bleed too.

The version we had on test was revision A01, which solved the problem of the previous revision of only displaying half a screen when booting – requiring you to power cycle the monitor to display the correct image. Although refined somewhat from the previous version, sadly we don't think this model is worth £470. It is, however, being phased out in favour of the aforementioned newer 32" UP3214Q.

Philips Brilliance 288P6

DETAILS
- Price: £365
- Manufacturer: Philips
- Website: goo.gl/np84Wo
- Requirements: GPU capable of hitting 4K resolutions, Only a VGA cable supplied so you'll need HDMI or DisplayPort

The Philips Brilliance 288P6 is one of the better 4K monitors we've tested this year

It's not a bad price at the moment, at nearly £100 cheaper than when it was first released

The Philips P-line of monitors caters for professionals and workplaces. CAD use, picture and video editing and other such uses are the order of the day here. But does this model from Philips have what it takes to pitch above the other examples we've looked at so far?

This is a 28", W-LED backlit, TN panel with a maximum resolution of 3840 x 2160 and a Smart Response time of 1ms. There's a 50,000,000:1 contrast ratio, 300 cd/m2 brightness rating and support for 1.07 billion colours.

The connectivity on the Philips 288P6 is excellent, with VGA, DVI, DisplayPort and HDMI/MHL-HDMI for the video inputs. Plus, there are four USB ports (two of which are USB 3.0 with fast charging), PC audio in and headphone out.

There are a pair of 3W speakers built in, which are surprisingly good. Naturally, you won't get the deep bass and more clear frequencies you'd experience from a set of dedicated desktop speakers, but if you have limited desk space, these are certainly adequate and deliver a reasonably good level of output.

Build quality is superb. The large base and screen itself are solidly designed and pivot and tilt without any hint of plastic stress. The heavy base is ideal for a large monitor and helps keep everything stable, while still providing height adjustment and the other aforementioned ergonomic benefits.

> "Quite well priced for the amount of features and the quality"

The picture quality too is similarly excellent. Philips has done a magnificent job of crafting a panel that really shows off the ultra-high definition quality of 4K resolutions. It's amazingly clear, sharp and crisp, with some of the best colours we've ever seen on a monitor. Needless to say, both gaming and watching HD 4K content was an absolute joy to behold. But normal, everyday duties were also a pleasure, with a superb clarity on the standard Windows desktop that was gentle on the eyes for longer periods. However, as with higher resolutions, we find it best to increase the size of the icons and zoom in when using Word.

There are a few preset picture settings available, the best being the Philips SmartImage feature, which will auto adjust the various levels according to what's being presented on the screen. You can though opt for a custom user setup, should the SmartImage setting prove to be inadequate for your tastes.

As you can tell, we were pretty impressed with the Philips Brilliance 288P6. It's an exceptionally good monitor and one that we can quite easily see being adopted into our current setup.

At around £365, the Philips 288P6 is quite well priced for the amount of features and the quality. It's only slightly more expensive than the Acer and AOC models, but offers a far better level of quality throughout. Certainly one to keep an eye on for a 4K upgrade.

LG 31MU97-B

DETAILS
- **Price: £900**
- **Manufacturer: LG**
- **Website: goo.gl/0ITCcu**
- **Requirements: CPU capable of 4K resolutions, DisplayPort cable not supplied**

LG has done an exceptional job with its range of 4K TVs over the last year or so. Enter the likes of Currys, and you'll see a selection of superbly presented and technically wonderful 4K LG models on offer. But has the company managed to mirror that success with its monitor range?

The LG 31MU97-B is the only 4K monitor in LG's arsenal of ultra-high resolutions monitors, which seems a little strange considering what the company has so far accomplished in the UHD market. However, the only model available from LG it is in fact immensely impressive. The 31" IPS screen has a maximum resolution of 4096 x 2160 pixels at 60Hz, a 50,000,000:1 dynamic contrast ratio, a response time of 5ms, 178° viewing angles and an advertised Adobe RGB colour spectrum of 99.5%, along with a 10-bit colour depth, which supports over one billion colours.

Connectivity comes in the form of a pair of HDMI ports, a single DisplayPort and a mini DisplayPort. There's also a three-port USB 3.0 hub and adequate ergonomic features with a -5° to 15° tilt, height adjust to 140mm and pivot.

The design of the monitor is excellent, with a reasonably thin bezel surrounding the anti-glare coated screen.

The LG 31MU97-B is an exceptionally good 4K monitor

But at £900, it's a little too expensive for what it is

> **"The screen quality was simply superb, probably the best we've seen"**

Movement through the tilt, pivot and height adjustment was fluid and without the usual accompaniment of plastic under stress.

The screen quality was simply superb, probably the best we've seen so far out of the entire group. 4K content was presented perfectly, with each microscopic detail being sharp and clear and with deep and detailed colours, as well as shadow detail and excellent brightness and contrast.

Despite that, there are a couple of problems with this monitor. The first is the lack of HDMI 2.0 support, because the LG 31MU97-B only has HDMI 1.4. This means you won't get full 4K at 60Hz through the HDMI port, so you'll need to use the DisplayPort connection. It's becoming quite common these days, especially on much higher-resolution connections, but for a monitor of this standard, it seems like an odd omission, and since it has two HDMI ports, you'd think at least one would be the latest supported version.

The second issue we have this monitor is the cost, as the LG 31MU97-B comes in at a rather shocking £900 minimum (we've seen some examples going for well over the thousand pound mark). While the quality of the 31MU97-B is excellent, spending £900 on a single monitor, even if it is 4K UHD, is a little extreme, even for those with very deep pockets.

If you can stomach the initial cost of the LG 31MU97-B, though, you're in for a real treat, but at the moment it's probably just out of reach for the average consumer and, to be honest, it's probably not worth the expense for business users.

EDITOR'S CHOICE micro mart

Philips Brilliance 288P6

It was a difficult group this one, since the monitors on test were of a much better quality than the usual HD ones we're used to.

However, we believe the Philips Brilliance 288P6 offered the best quality, in both design/build and screen output and value for money. While it's not as cheap as the Acer or AOC, it's a better monitor overall.

HIGHLY COMMENDED micro mart

AOC U2868PQU

If you're after a cheaper 4K solution, then we would recommend you look no further than the AOC U2868PQU.

It may not have the build quality or even an image that's quite as sharp as the BenQ, Philips or LG models, but it's certainly no slouch either. And considering it's just a tad under £300, it's worth looking into.

How We Tested

Each 4K monitor was hooked up to a GeForce GTX 970 4GB graphics card, via HDMI and/or DisplayPort. We tested a number of YouTube 4K videos, as well as some full HD movies. For games we ran *War Thunder*, *Elite: Dangerous* and *Sniper Elite 3* in the highest resolutions possible.

	Acer CB280HK	AOC U2868PQU	BenQ BL2711U	Dell UP2414Q	Philips Brilliance 288P6	LG 31MU97-B
Price	£290	£295	£500	£470	£365	£900
Screen Size	28"	28"	27"	23.8"	28"	31"
Response Time	1ms	1ms	4ms	8ms	1ms	5ms
HDMI Ports	1	1	2	1	1	2
DVI Ports	1	1	1	0	1	0
VGA Ports	0	1	0	0	1	0
DisplayPort	2 – 1 mini	1	1	2- 1 mini	1	2
USB	0	4	4	4	4	3
Height Adjust	Yes	Yes	Yes	Yes	Yes	Yes
Tilt	Yes	Yes	Yes	Yes	Yes	Yes
Pivot	Yes	Yes	Yes	Yes	Yes	Yes
Weight	9.4kg	10.95kg	8kg	10kg	8.04kg	9.3kg

Your Letters

Re: Wrong Fuel App

I may be missing something here, so apologies before I start. At the same time, congratulations to the three boys for being innovative and creative with the app programming. But I have two areas where I am a bit confused.

The first is the whole concept of programming and coding, especially around the miniature 'board' PCs – Rasberry PI , Arduino etc. Whilst these probably have many uses for controlling objects such as mini cameras in balloons, why can't a normal desktop PC not be used to teach programming? As I understand, it both can use and do use Linux, so why go to the additional expense of acquiring power supplies, keyboards, monitors etc, when this is already present in the current PC setup. And as for coding, although the syntax may be different, fundamentally the logic in coding is all very similar. My first introduction to coding was Fortran 4 some 40 years ago, then BASIC, especially the version of BASIC that came (built in) with the original IBM PC, through various versions of Access and dBase. I am currently using XAMPP, which allows for integration with MySQL and tested on one's own local server (Apache) or posted as a live site on the web. And all of this is free!

The second relates to the project itself. Whilst I applaud the concept, is it real and practical? In order to for the app to work, every driver would have to download it to their smartphone. The description then says that the "app uses publicly available data to identify the vehicles number plate when it pulls into the filling station, links to the DVLA to determine the engine and model number and then disables the fuel pump if it is the wrong fuel". Assuming that at some point the driver has to input the vehicle number (bearing in mind that this technology to automatically read number plates is well developed and in use in parking lots and other vehicle control applications), there still has to be some device that will process the information (i.e. switch off the pump) that now has to be transmitted from the phone. This also assumes that all communication devices are available, switched on and working at the time. Would it not make more sense if, in addition to the cost of installing the equipment which would be required to turn off the pump in the event that the 'wrong fuel' signal was received, to add the number plate recognition application, which would do this all automatically. This would then only switch on the correct pump and avoid the wrong fuel.

As I said at the outset, I may have missed something if not everything. However, I am a firm believer in Occam's razor, and the reality and practicality of a proposal should also be taken into account.

Barry Gower

Enjoying Micro Mart

Harry, one of your younger readers, catching up on his Micro Mart on holiday in France recently.

Keep up the good work

Dan Griffiths

Free Alternatives To Commercial Software

Just a small comment on the above article: thank you!

At last, an article that doesn't blithely perpetuate the myth that suites such as Libre Office, etc., good though they are, are compatible with Microsoft Office in any meaningfully serious working environment. Great for home users who knock off the odd letter or use a spreadsheet to present simple tabular data, but not if you want any serious formatting or functionality and want to share your work.

Dick Pearson

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STEP 3 Tap 'Subscribe'

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STEP 2 Tap the 'Subscribe' button

STEP 3 Choose whether to create an optional Zinio account

STEP 4 Enter your Apple ID password to confirm

Subscribe to *Micro Mart* today and save on the single issue price

Code With AI2

Browser

Build an Android web browser app with David Briddock

Over the last few issues, we've used App Inventor 2 (AI2) to build a useful timer and a motion-activated dice shaker.

This time, we're going to build a fully functional web browser, and it's much easier than you might think.

Remember, all you'll need to play along is a Windows/Mac/Linux PC, a web browser and a Google account. Ideally you'll also have an Android smartphone or tablet, but even this isn't essential.

What We'll Learn

We'll need to use a horizontal layout component again, but this time it will host four separate components.

In addition, we'll introduce the purpose-built and easy-to-use web viewer component.

Starting AI2

In your browser, navigate to the AI2 home page (**ai2.appinventor.mit.edu**) and sign in with your Google account.

We need a new project, so in the Projects menu select the 'Start new project' option and give it a meaningful name, such as 'MMBrowser'.

Screen Properties

We're automatically placed in Designer View mode. Notice there's already a component called 'Screen1'. We'll drag and drop the other components onto this screen.

In the right-hand Properties panel, ensure the AppName is set to 'MMBrowser', then set the Title to 'MM Browser' and the BackgroundColor to dark grey. Lastly, set the ScreenOrientation to landscape, which is more appropriate for a browser.

Now we'll add some screen components.

Creating A Header

Now let's create a web browser like header. As this header contains multiple components, we'll use a layout. Over in the left-hand Palette panel, open the Layout group and grab a HorizontalArrangement component. Drag and drop it towards the top of the Screen1 area. A blue bar appears to indicate its drop location.

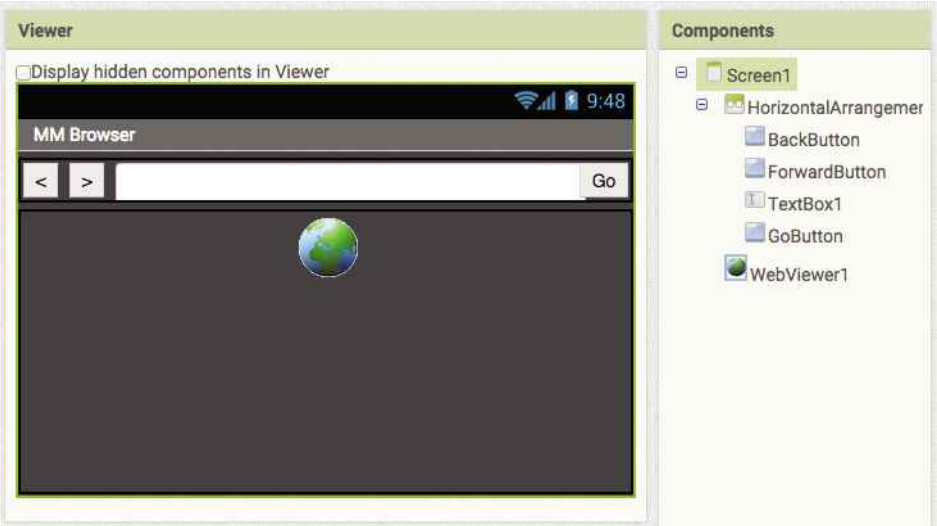
With the HorizontalArrangement1 component selected in the Properties panel, set the Width to the 'Fill parent...' option from the pop-up list.

Next select a Button component from the User Interface group and drop it onto the left-hand side of the horizontal layout area. Rename this button to 'BackButton', then set its Text property to the '<' character.

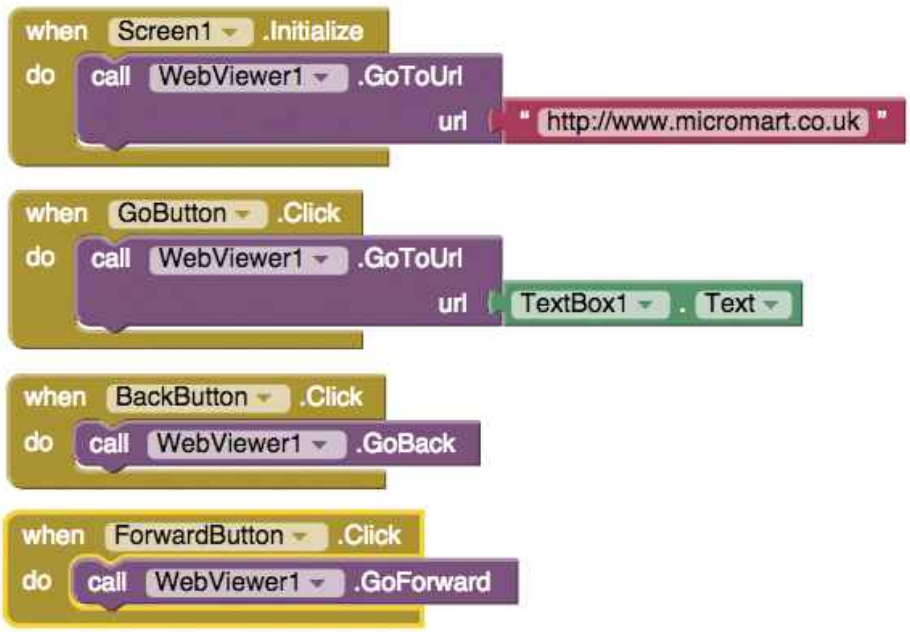
Grab another button and place it just to the right of the BackButton. Rename this button to 'ForwardButton', then set its Text property to the '>' character.

Now grab a TextBox from the User Interface group and drop it next to the ForwardButton. This will be our web address input field.

The final header element is another button component dropped to the right of the TextBox1 component. Rename this button to 'GoButton' and set the Text property to 'Go'.



AI2 designer view



AI2 blocks view

Finally, select TextBox1 in the Components panel and set the Width property to the 'Fill parent...' value.

The WebViewer

The remainder of the screen is dedicated to displaying web pages. Communicating with the internet, downloading pages, then decoding the HTML, CSS and JavaScript code isn't straightforward. Fortunately, we don't have to do any of this ourselves.

Instead we can just use the purpose-built WebViewer, which already has all this behaviour. Grab a WebViewer component from the User Interface group and drop it underneath the header's horizontal layout.

With WebViewer1 selected in the Properties panel, set both the Height and Width properties to the 'Fill parent...' value.

App Start Code

Now it's time to start coding, so click on the Blocks View button located on the green bar.

When the app starts, we want to load the home web page. Over in the left-hand Blocks panel, click on the Screen1 component, grab a brown 'when Screen1.Initialize' block and drop it into the Viewer panel's coding area.

To set the inner 'do' behaviour, go back to the Blocks panel, select WebViewer1 and grab the purple 'call WebViewer1.GoToUrl' block. Snap this inside the brown block.

Notice this purple block requires a single 'url' value to be set. We can do this with a simple text string block from the Text group. Grab one and snap it next to 'url', then enter a valid web URL string – for example 'http://www.micromart.co.uk'.

Button Behaviour

Now to define what happens when we click on the back, forward and go buttons, located in the header. Once again, the flexibility of the WebViewer component makes this a straightforward task.

In the Blocks panel, click on the BackButton component, grab a brown 'when BackButton.Click' block and drop it into the coding area. Now repeat this process for the 'when ForwardButton.Click' and the 'when GoButton.Click' blocks.

The inner 'do' space for the BackButton is populated with a single purple 'call WebViewer1.GoBack' block from the WebViewer1 component. Snap it inside the brown block.

It's a similar story with the ForwardButton, as once again we only need a single block. This time it's a purple 'call WebViewer1.GoForward' block from the WebViewer1 component.

Finally, we come to the GoButton. For this grab a purple 'call WebViewer1.GoToUrl' block, just like the one we used inside the Screen1.Initialize event block.

As we now know, this block requires a 'url' value. However, this time we want to use the text string associated with the TextBox1 component, so from the TextBox1, grab the light green 'TextBox1.Text' block and snap it next to the 'url' tag.

And that's the coding done. Ensure the warning and error counts in the bottom-left are both zero, then carefully check your code against the Blocks View image.

Testing

We can test our app using the AI2 Emulator. However, you'll notice that it doesn't take account of the landscape orientation. A better option is to use the AI Companion App installed on an Android device and the Connect menu (as we discussed earlier in the series).

Going Further

One simple change would be to set the Image properties on the BackButton and ForwardButton. Any suitable PC-hosted image file will work fine. A more challenging option would be to add other buttons that call other WebViewer1 functionality, such as clearing the page history or web cache.

And if you switch on the WebViewer1 property called UsesLocation, the device's location sensor is involved when using mapping and other geo-location websites.

Next time, we'll build a pixel density calculator based on a pixels-per-inch (PPI) formula. **mm**

The Best Places To Buy DRM-Free Content

We have a little look at where to get hold of restriction-free media

Our digital world is an incredible thing to behold. At the touch of a button we can lay our hands on news, music, books, games, films and goodness knows what else, and we can enjoy this content wherever we go and on whatever media device we want. Mostly.

With this digital age, though, comes a set of restrictions that govern what and where we can view the media of our choice. It controls what devices we can view our bought and paid for media on and even goes so far as to spy on our media viewing habits.

These restrictions are collectively called DRM, (digital rights management), a set of access control technologies that, for one part of the equation, help keep the content safe for the copyright holder. But on the other hand, it can be argued, it keeps big businesses in power and strangles innovation and the creative process. As the author Sakina Murdock once said, "A DRM-free book is forever, not just for Kindle."

There are two sides to every argument: protection of intellectual property or anti-competitive practices. Which side you lean towards is up to you. We won't get into the argument here; we'll leave that for the letters page, should you wish to put your view across.

What we thought we'd look at is DRM-free content and where to go to find it. We'll concentrate on books, music, video and games, which should contain a little something for everyone.

Books

Most ebook sellers will attempt to lock you into a particular system, as per the whole DRM practice, but there are some ebook stores that instead opt for a more liberal approach.

Foboko

Foboko is an American ebook shop from Carson City, Nevada. The company's mission is to promote literacy and share the authors' works with the world, with free access to everyone regardless of what device they decide to read the content on.

If you're an aspiring author, you can get your work on here; otherwise you can sign up for a free account and start. Some books are for free, whereas other cost just a few dollars (you'll need to convert to pound sterling, obviously), but there's a pretty good choice of various genres available. If you fancy a look, you'll can find out more at **goo.gl/eJy9S7**.

OpenBooks

OpenBooks is an independent ebook shop that has a slightly different method of paying for the books on its virtual shelves. Basically, you read the book first, then you decide how much you want to pay based on how much you feel the book is worth and how much you can afford.

The Book View Café is a good stop for the bibliophile to pick up a DRM-free ebook

Naturally, there are circumstances where people refuse to pay anything, but generally those who visit and participate in the site have a positive view on society and are quite happy to put their money towards the concept.

There are some really interesting books available through OpenBooks; take a look at **goo.gl/AKvtbH** and see if there's anything for you in there.

Book View Café

Book View Café's outlook on DRM-free books is simple, as the company slogan clearly states" "…because you can never have too many ebooks."

There are hundreds of ebooks available through Book View Café, ranging across all genres, from sci-fi through to rather saucy romance novels. Prices vary, and you can buy the books in ePub or PDF format for DRM-free reading on pretty much any device.

It's worth having a browse through the available titles at **goo.gl/Z02l0D**.

Tor Books

Tor books UK goes back a long way and is the well-known publisher of the old The Adventures of Conan books by the likes of John Maddox Roberts, Steve Perry, Robert Jordan and Leonard Carpenter.

Although the Tor Books ebook collections are now sold through Pan Macmillan, the collection still remains DRM-free and is some of the best sci-fi and fantasy material available today.

More information on what's available as well as contact details can be found at **goo.gl/CJhYKb**.

The Robot Trading Company

The Robot Trading Company, formally known as The Angry Robot Webstore, prides itself on the vast collection of DRM-free publications it has on its virtual shelves.

All the ebooks her are sold in ePub format and are compatible with a number of different ereaders, such as Nook, Kobo and so on, as well as phones and tablets with the appropriate reader app installed.

Prices vary, but you'll find some excellent titles from every genre, at an average of around £5.49. It's a great ebook shop and well worth a visit, either for casual browsing or for purchasing your next good read. Head on over to **goo.gl/sKEtGH** and check out the selection.

The Robot Trading Company has plenty of titles available

Music

The music industry is one of the greatest proponents of DRM technology. In fact, it was the music industry that originally sparked the whole DRM argument.

While the debate is far from over and both sides are mostly at each other's throats, those of us who simply want to listen to music without having to buy a particular item of hardware can do so from the following music stores that currently wave the DRM-free banner.

eMusic

eMusic is probably one of the most popular DRM-free, subscription-based online music stores outside of iTunes.

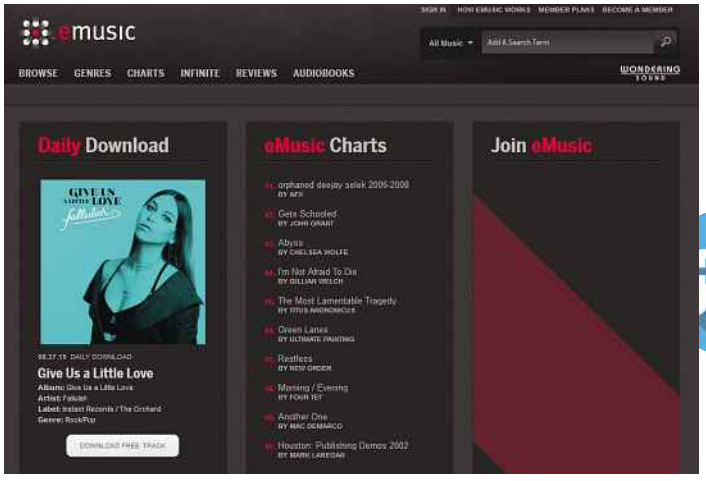
There's a huge selection of indie titles as well as audio books that cover nigh-on every genre you can think of. Prices are in dollars but seem reasonably cheap when you convert them to pound sterling.

For more info or to sign up for an account and to check out the catalogue, take a moment to visit **goo.gl/C8AEnm**.

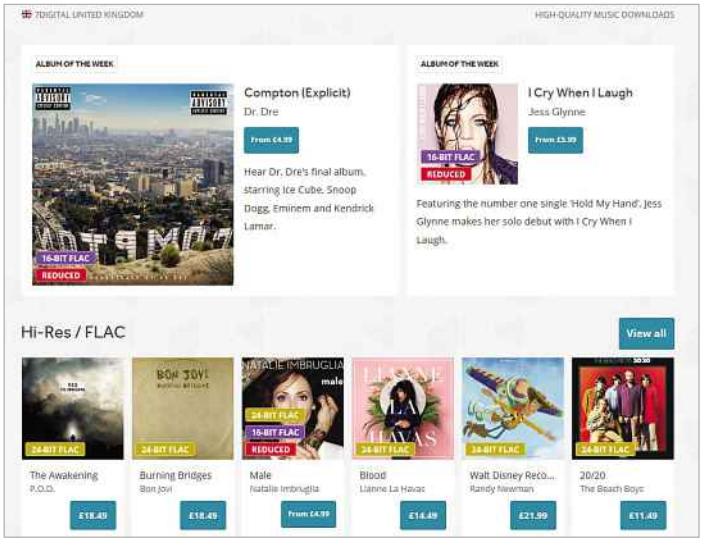
7Digital

7Digital offers many different formats at a range of prices depending on the content. Most of it is DRM-free, but there are some examples that aren't. You'll need to have a look at what's on offer from the list of singles and albums, but there's generally plenty to satisfy the DRM-free browser.

Prices are good too, from 99 pence through to £10.50 and beyond, plus there are highlights from various festivals, and interviews with



eMusic is quite a big thing these days, we're told



7Digital is another DRM-free music platform, among many others

aspiring bands and indie groups, as well as the occasional music legend thrown in.

There's a lot going on, so take a look at **goo.gl/0kM79h** and see what's there for you.

Analekta

If listening to 'Now This Is What I Call Music 50,000' isn't your cup of tea, then Analekta may have something more to your liking.

This is a DRM-free classical music store that has a vast collection of titles in its catalogue. Although the front page is in English, you may find that subsequent pages, such as the search, end up reverting to French Canadian – it's not a big deal, though.

Prices range and are in Canadian dollars, but the content can be streamed for free before you decide to buy an album.

There's certainly plenty to look at here. Just head over to **goo.gl/YXIBcM** and see what takes your fancy.

Napster

Those of you old enough will recall sitting up all night on dial-up while illegally downloading an album from Napster (note: we never did anything like that).

These days and after the site was shut down for obvious reasons, the name was relaunched and has become one of the better, legal, DRM-free music stores on the internet. It's mainly streaming based, but you can opt to store the music on your device for offline listening.

It's subscription-based, starting at £5 per month for unlimited music on your PC or Mac and rising to £10 per month for computers, smartphones and tablets.

Amazon

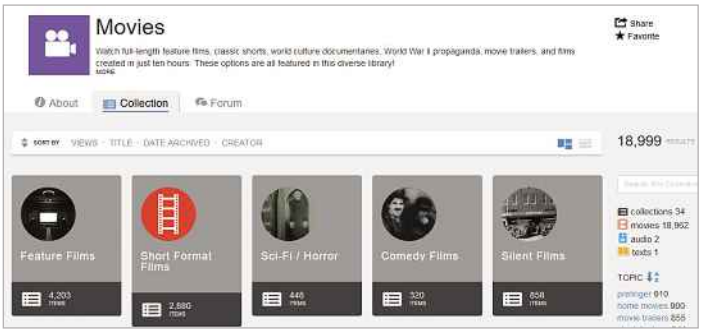
Despite the whole Amazon is evil stance from a lot of people, the company is probably the biggest DRM-free digital music store there is. Digital music is stored in your Amazon music library and is available to download or play from any computer or other compatible device.

There's little need to go into what's available on the Amazon music store; it'll probably be easier to list what isn't on there (the Micro Mart karaoke sessions aren't, sadly).

Anyway, in case you need a link to the music section on Amazon, it's **goo.gl/XKAA7L**.

Play.com

Play.com, one of the many arms of the Rakuten empire, sells an impressive selection of DRM-free music for almost every genre



There are some classic on the Internet Archive, all DRM-free, of course

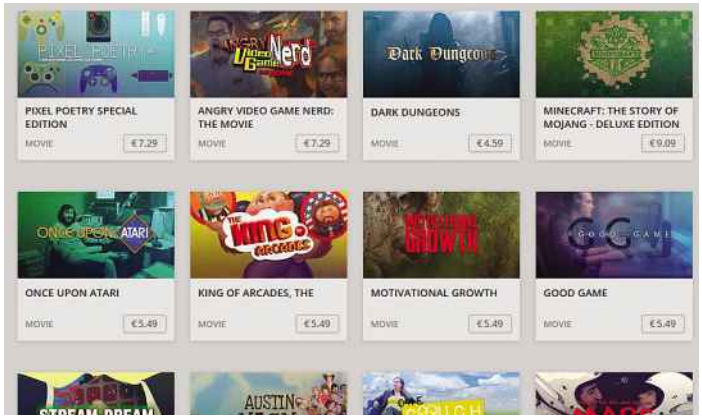
you can think of. You'll need to set some time aside to browse through the media, mind you, as it's quite a weighty setup. Prices can be as low as 99 pence, mostly for the content no one has ever heard of. However, there are chart albums available if you look hard enough.

You'll find the catalogue at **goo.gl/cnarfT**.

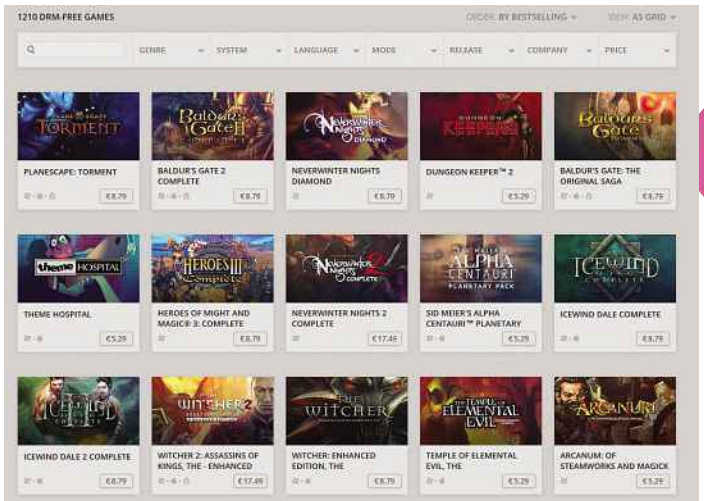
Video

The film and video industry is a little behind when it comes to DRM-free content. While there's a vast catalogue available from various sources, the content isn't always the best or most modern you'll come across.

You sadly won't find the latest blockbuster movies, but you will find some absolutely wonderful classics, many of which are actually free to download and watch.



We're not totally convinced about the quality of the movies on GoG



The games on GoG are much better, though, compared to the movies

The Humble Bundle keeps on going from strength to strength

The Internet Archive

The Internet Archive remains one of the best places on the internet to get hold of virtually anything. Somewhere within its labyrinthine layers you'll be able to play Spectrum games, listen to propaganda recording from World War 2 or watch some of finest classic movies ever.

With the likes of *Plan 9 from Outer Space*, *Invasion of the Bee Girls* and *Return of the Kung Fu Dragon*, you can stream or download the content for viewing on any platform.

There's a ton of stuff to browse through here. Some of it is absolutely terrible, but there are hidden gems if you're prepared to look for them.

Take a look at **goo.gl/aytGof**, for anything worthwhile.

GoG.com

GoG (Good old Games) isn't just for PC games; the company also has a small collection of DRM-free movies you can purchase and download.

Unfortunately, as far as we can tell, none of the movies listed appear worth watching. As you can expect, we haven't watched them all, but just browsing through the brief catalogue is enough to warrant that claim.

Mind you, if you're rather fond of *Ecstasy of Order: The Tetris Masters* or a documentary on the Pirate Bay, then GoG could be the right place for you.

The prices range, but the average cost appears to be €5.49. More information can be found at **goo.gl/6Kmlut**.

Games

Despite the fact that Steam is now the biggest platform for PC games and gamers, there are many who have taken a dislike to Valve's approach in the past and have since gone elsewhere for their gaming needs.

Steam isn't the only culprit of course; many gamers find Ubisoft's DRM or EA's Origin a nightmare to use. So where can gamers go in such times?

GoG.com (again)

GoG, as we mentioned above, is now one of the most instantly recognised platforms for DRM-free gaming.

Over the last couple of years, the site has grown to the point where there are now over a thousand titles available, all with a DRM-free label stamped on them. Interestingly, GoG isn't just for older PC gaming, and you'll also find a selection of new titles available, including the likes of *The Witcher 3*.

To browse the collection, simply go to **goo.gl/R56UpW** and sign up for an account.

Defective by Design

One of the main advocates for DRM-free content is the site Defective by Design. On here you'll find links to hundreds of DRM-free content providers where you can buy virtually any form of media without limiting your freedom of viewing.

Admittedly, though, while a good resource, the site does tend to get a little too activist at times, especially in the blog and Twitter feeds, with many an argument being blasted from one individual to another. Provided you avoid the conflict, the rest of the site is well worth a look.

Humble Bundle

The Humble Bundle has proved to be a massively popular, limited time scale sale of a collection of DRM-free titles.

You can select how much you want to pay for a collection, with the average payment being around the $3 mark, with over 78,919 purchases to date. The collections differ but now cover Windows, Mac, Linux and Android devices, plus the Humble Bundle supports the American Red Cross and the Electronic Frontier Foundation.

If you're up for some great indie gaming, then the Humble Bundle is a perfect match and can be found at **goo.gl/87Naoi**.

Desura

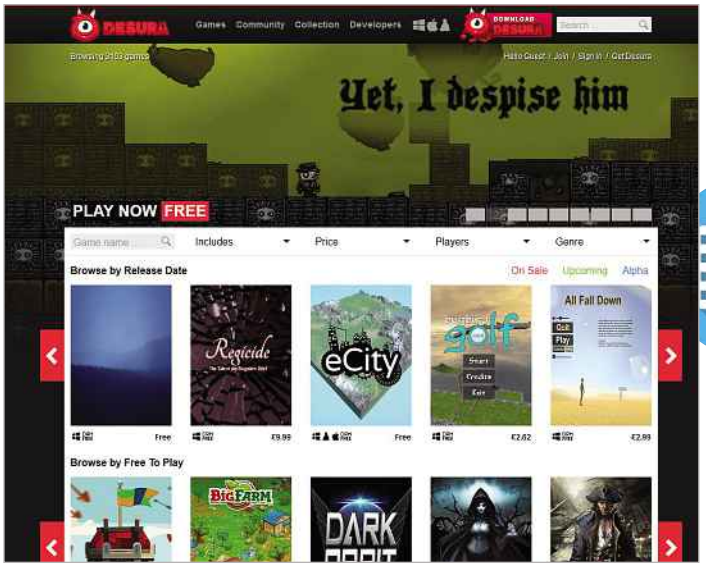
Desura is quite popular among Linux gamers and has been for some time. However, it also has an impressive collection of Windows and Mac games available too – all DRM-free, naturally.

Prices range from free through to over £20, with one being valued at £999 (we won't mention it, as it seems to be something of an odd title).

Regardless though, there's plenty to keep even the most prolific gamer happy on Desura and you can see what we mean by having a look at **goo.gl/xtLy7Z**.

DRM-free Forever

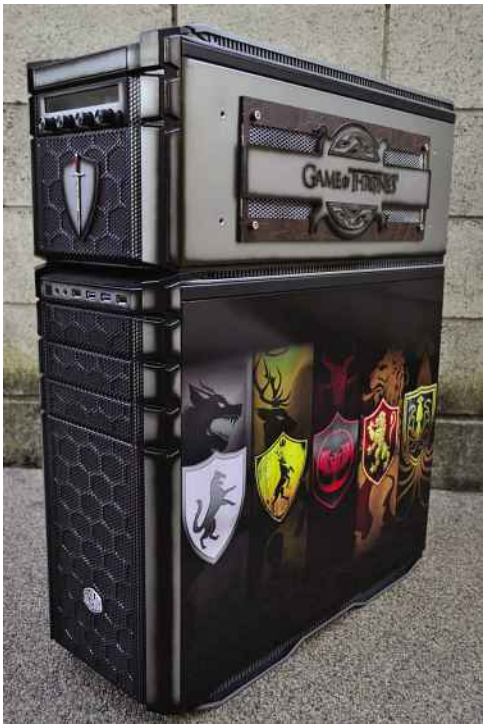
This is just a brief look at what's available, and needless to say there are plenty more sites and online shops with DRM-free content out there for those who want to look for it. **mm**



Desura is more known among the Linux users, but there's a lot on offer here for Windows and Mac gamers too

A Look At The Hardware Modding Scene

With the right knowledge, you can improve just about anything, and the modding scene is full of people who do just that



➤ *A PC themed on the hit TV show, Game of Thrones*

Companies spend countless man hours and masses of money designing and refining new hardware. Whether it's graphics cards, CPUs, PC cases, keyboards, or game controllers, there's a large design team that spends its time creating the best product possible. Or does it? Even the best piece of hardware will fall short of some people's expectations, and the old adage of not being able to please everyone all of the time is very true.

So, what do you do if this is the case? Well, some people decide to take matters into their own hands, and have a go at engineering their own solutions by modifying existing hardware to suit their needs, or to make an otherwise poor piece of hardware perform better. It's also popular to create visually impressive modifactions.

The people that do this are commonly called modders, and there's very little in the hardware world they won't have a tinker with in order to customise things to their liking. So, we're going to have a look at this modding scene, focusing on the kinds of modifications you'll usually see, as well as some of the most prolific modders around. If you can't make that square peg fit that round hole, maybe a bit of modding inspiration will help.

What Is Modding?

What is moding, exactly. Well, just to be clear, we're going to be looking at hardware modding here, not software, so we won't be focusing on custom made game modes or features for the likes of *GTA V* or *Skyrim*. Instead we're looking at the kinds of mods that take an existing, off-the-shelf piece of hardware, and change it in various ways, such as to make a device more personalised, or to give it a more accessible feature set for disabled users. There are any number of reasons people may want to perform such modifications, and regardless of this goal, the end results almost always retool the hardware so it'll function differently, look better.

By far the most common form of this is PC modding; people who dabble in this area spend a lot of time and effort altering existing PC cases and hardware to look different or run differently. This may be to make a PC run better with improved cooling or space for expansion, or simply to create a unique-looking PC, often themed after various licenses, including movies and games. In fact, the latter is possibly the most common, and those who create such modifications do so purely to create great-looking systems. However, there are some PCs that are created not just for looks, but to show how far a PC's form factor can be pushed. This may be to create an ultra-small system, or a system that takes up an entire desk, such as the impressive L3p D3sk (one of our featured mods, see Ten Great Mods section).

Some modifications are easier than others, but none are simple, and often a lot of skill is required. There is a level of ability within the modding world, though, and some people are far more accomplished than others. Without a doubt, one of the most skilled, and famous modders is Benjamin Heckendorn, better known as Ben Heck. Known for his unique builds and modifications, which are shown via his YouTube channel (**www.youtube.com/user/thebenheckshow**), Heckerdorn work extends from the impressive to the downright odd.

Some of his best work has been to take console game controllers and retrofit them for disabled users. He's also made a slew of custom machines using modded games consoles, PCs, and combination systems that combine more than one device, such as an Atari 2600 and a PlayStation 2. He shows that modding isn't solely limited to creating custom PC cases, and can be taken to the next level by using these skills for many others tasks. He even created real-world Minecraft Redstone circuits, just because he could, and created a portable PS2, including it's own screen, as well as a hand-held N64, also with its own screen. His PS3 laptop is another impressive creation, turning the third generation PlayStation into a fully working, portable system.

Heck's show is produced by Element14 (**www.element14.com**), a website dedicated to supplying engineers and hobbyists,

Ben Heck's PS3 laptop is a sight to behold

The portable PS2, created by Ben Heck

Ben Heck's portable N64

Ten Great PC Mods

L3p D3sk – Peter Brands

The L3p D3sk is an impressive, and big, PC mod that brings together a vast array of high quality hardware into a neon-soaked desk that Tron would kill for. The system, built into the desk itself, and can be seen through the clear tabletop, features an Intel Core i7 5960X running at 4.5GHz and a pair of Nvidia GTX980s, installed on an Asus X99 Deluxe. There's 16GB of Corsair Vengence LPX RAM, and storage consists of a gaggle of SSDs, including Corsair Neutron XTs, and an Intel 750 SSD. A couple of Seagate Barracuda 4TB HDDs also sit in the unit.

The monitors include an LG 34UM95-P, two Dell 1703 17" portrait units, and are flanked by Bose speakers. All of this is set up in a jealousy-prompting ultra-wide gaming configuration. The whole system is liquid-cooled, of course, and is just stunning.

AzTtec – Dan McGrath

One of the most eye-popping mods we've ever seen, there's so much detail you just can't help be amazed at the amount of work that's gone into Dan McGrath's Aztec temple-themed system. Built around a Thermaltake Level 10 GT, each and every component of the case – including the optical drives, floppy and power button – are customised to look like old sandstone-like building blocks. There's even a selection of detailed carvings, with Aztec/Mayan snakes, skulls, eyes, and all sorts of other intricate details – right down to moss-lined and weathered areas.

L3p D3sk

AzTtec

ThermalTHOR

WMD

ThermalTHOR – Suchao Prowphong

In the Marvel universe, Mjölnir can only be wielded by the worthy – it's best known keeper being, of course, Thor. As such, a PC made out of this mystical weapon is bound to be a powerhouse desired by anyone who sees it, and Suchao Prowphong's ThermalTHOR is every bit the worthy digital duplicate of the Norse power tool.

Based on the prop from the *Avengers* movies, ThermalTHOR is a custom PC case, seated in a stone-effect base that includes flashing blue lights to recreate bolts of lightning emanating from the hammer itself. What's more, when the PC is turned off, you can even exercise your godly right, and lift the hammer out of the cradle. Just remember, with great power... and all that jazz.

WMD – Peter Dickison

If you like your PC to resemble something that could very well cause death and destruction, you'll love Peter Dickison's WMD. This PC case has been constructed to resemble a nuclear bomb of sorts (or at least a Bond movie's version of one; think *Octopussy*, perhaps), complete with large, red LED timer, keypad, and cylindrical core.

Here the core contains the actual PC components, not a devastating payload, but the case mod looks so good it could easily pass for a real bomb, at least one from the movies. If you were carrying this around in your car and were stopped by the police, we suspect you'd have some explaining to do.

Steampunk TJ11 – Shane Fuga

Strampunk is a very popular style, one that's found in all sorts of areas, including computing. The idea of powering a computer using steam and mechanical cogs and valves has captured the imagination of many, and the use of brown leather, bronze, coppers, and other materials looks great when applied to modern technology.

The Steampunk TJ11 mod by Shane Fuga is a brilliant example of this, and one that's been painstakingly created using a steampunk aesthetic, inside and out. The outer case has a brown leather feel to it, with all sorts of cogs, gears, and grilles adorning it. Inside, every aspect of the machine continues the theme, with brass-effect cooling pips and heat sinks, old-school valves, and wooden panels. There are other nifty details, including the antique number display on the front of the unit, and the water cooling reservoir is a large cylinder with a water level window.

Sputnik 0667 – Love Hulten

This is a PC that'd look perfectly at home next to antique furniture. It's a beautiful system, actually inspired by 20th century design and old Hi-Fi creations, that's contained in a wooden case with a flip-out keyboard/desk, and boasts an integrated monitor, retro flip switches, and built-in stand. Actually, very 70's in actual design, the unit just oozes class, and follows the same design principles Love Hulten shows in other projects, mixing wood and technology to bring old and worlds together.

Steampunk TJ11

Sputnik 0667

Anime Girl

Anime Girl – Katsuya Matsumura
This is certainly one of the stranger PC modifications, but it's not the only one of its kind. It's certainly one of the most impressive, though. This PC mod by Katsuya Matsumura has been built to resemble a typical female anime character, and is a ¾, almost life-size creation that's more than happy to perform all of your computing tasks (we'll leave the obvious jokes to your own minds here).

The PC has a metal skeleton frame inside, and the outer shell is styrene foam coated with resin clay. The actual PC components are situated in the girl's back, and hair section, which also covers the inner workings.

Batmobile Tumbler – Kevin Core
Here's another superhero-inspired mod, this time from the world of DC. It is, of course, Batman, more specifically the Tumbler Batmobile seen in Christopher Nolan's movies. Kevin Core has created a 1:6 scale replica of the unique vehicle, in order to fit his custom-built PC.

The unit itself features a two-level mounting system inside, in order to cram all of the components into the frame, and the exterior of the Batmobile lights up with an array of headlights and other illuminations. And yes, the wheels actually work

Tie Fighter – David Barry
Here's another mod that incorporates an entire PC desk, this time it's in the form of one of the most iconic sci-fi space ships ever – A Tie Fighter from Star Wars.

The mod is huge, as you can see, and the PC is housed within the cockpit under the desk, with the laser cannons represented by the power and HDD LEDs. The PC compartment is divided into several sections, each housing different core components, such as the main motherboard and CPU, storage, and expansion cards. With a mod this size, it's easy enough to cram in powerful components, but regardless of the actual spec, the force is strong with this one.

Weighted Companion Cube – zAAm
Valve's hugely popular first person puzzler, Portal, has a massive army of fans, and rightly so. The superb game has spawned all sorts of pop-culture references, including various Internet memes. It also gave us one of the most unlikely cuddly characters yet, a cube. More specifically, the Weighted Companion Cube. Despite being a simple crate with a heart painted on it, gamers became very attached to this inanimate object, so much so plush toys and other merchandise have been manufactured.

Batmobile Tumbler

Tie Fighter

A portable SNES

just like Heck himself, and many other modders. The site sells all manner of hardware components and tools, most of which are useful for those looking to do their own modding projects. This site alone is a testament to how popular the modding scene has become, and Heck's channel, which has over 400,000 subscribers and over 26 million views is further proof, and he's just one of many modders out there.

Other modders have also become fairly high profile in the scene, with some impressive portfolios full of work. Love Hulten (**www.lovehulten.com**), is a good example, with a site full of sleek, and sharp creations – usually involving a mixture of tech and woodwork – with a range of devices being created.

Peter Brands, whom we've already mentioned, also has his own YouTube channel, via which he showcases his various creations (**www.youtube.com/user/l3pje**) including the L3p D3sk. Also, Ronnie Hara, another prolific modder with a following on Facebook (**www.facebook.com/RonnieMods**) is well worth a look.

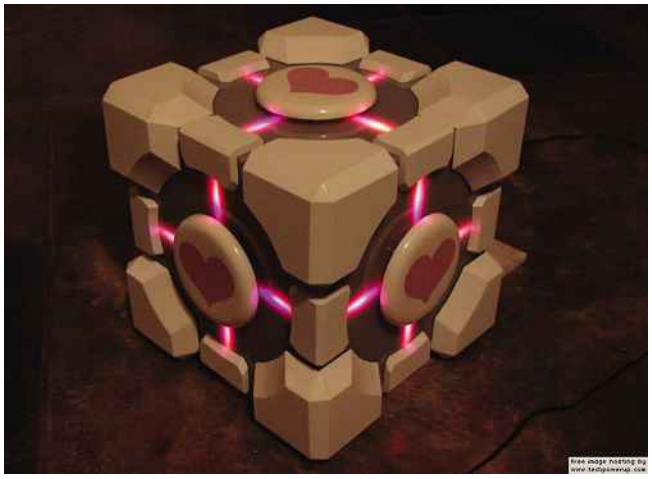
There are many other specialist sites now operating that supply modders with the items they need, and a quick search on Google or YouTube reveal results relating to modding, especially PCs, that are too numerous to count. As with most other things these days, there are also popular social sites with areas dedicated to the practice, including Reddit, Facebook, and

The Super Genintari

Modder, zAAm was also quite fond of this cuboid ally, so much so he created a PC case based on one. This slick mod reproduces the Weighted Companion Cube perfectly, and even includes variable lighting, which can change between pink, red, and blue. The actual PC connections are accessed normally by removing the rear heart panel, and the whole case can lift up to expose the inner workings, which is based on a standard shuttle-style PC. There's little difference compared to the in-game cube, and it's a superb mod, if simple mechanically.

You don't know Jack (PC)

While not strictly speaking a mod, we had to take a look at the Jack PC by Chip PC Technologies (**www.chippc.com**). It's a perfect example of just how impressive engineers and modders can be when they set their sights on something. The Jack PC is an entire PC that fits within a wall socket. Yes, that's a whole PC contained within a standard size wall socket, complete with USB, audio and video ports.



Weighted Companion Cube

The Jack PC, a tiny wall socket-fitted compuer

It's obviously a low power small form factor system, along the lines of the USB stick sized PCs hitting the market, so won't be playing the latest games, but it's still an impressive device; one that allows people to browse the Internet and use email etc. without having to use a large PC, or even a laptop.

Keyboard Mods

Most PC peripherals have been moddeds by people, including input devices like the keyboard. Sometimes these mods simply add an aesthetic flair to the usually mundane device, but others also add extra functionality. Here's a gallery of just a few.

Alchemist

Steampunk

Remote keyboard

Typekey

so on. It's a thriving community, and one that's one of the most impressive creative circles around.

Don't limit yourself to PC mods alone, though. It's not just Ben Heck who has dabbled with modding consoles, for example. Modder, Kotomi, created a portable Super Nintendo Entertainment System he dubbed the SNEP, and one of the best mods is the Super Genintari by Richard DaLuz. This device merges the Arati 2600, NES, SNES, and Sega Mega Drive into a single console.

What about he gamer on the move who wants to listen to music? How about the Dreamcast VMU Pod Nano case? This custom case is an actual Dreamcast VMU case, modified to fit an iPod Nano. What's more, you can even do this yourself by following the guide at **bit.ly/1PWBzw**c.

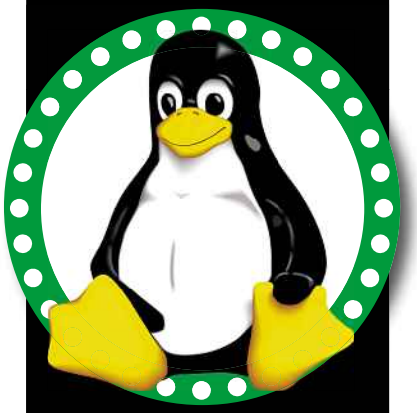
As well as sites feeding the modding movement with the materials it needs, there are also plenty of sites on the Internet geared toward teaching new, would-be modders how to tinker and tune their systems, and to create their own projects. Sites like **www.modders-inc.com** contains guides for all sorts of modding projects, so even those with little to no experience can get up and running, learning the basics. So, if all of these cool creations inspire you, why not give it a go yourself and become part of the modding community?

Official Support

Early on in modding days, companies weren't fully on board with the kind of antics modders were getting up to with their hardware. Just as overclocking wasn't an officially authorised practice, taking hardware and messing around with it was frowned upon, and many a warranty was squarely shattered. Whilst the warranty-breaking is still an issue for those who worry about retrofitting their PCs and other hardware, the negative opinion of modding from manufacturers has changed greatly.

Now, major hardware creators actively get involved with modding, to the point of making hardware far more mod-friendly, sponsoring modders and modding events, and even hosting their own modding shows, such as Nvidia's 24-hour live streamed modding event, Mod24 (**www.geforce.co.uk/whats-new/articles/mod24**). This has galvanised the modding community, and has made it all the more rewarding for those who want to exercise their abilities. Now you have the chance to not only be admired by the select few who frequent your YouTube channel or modding sites, but a larger audience. You can even win prizes for your efforts.

As you van see, the modding scene is brimming with creativity and with a new more public showing in various events, it a new medium with which tech-savvy users can show off their creative abilities. **mm**



Linux Cheat Sheets

This week, we look for a helping hand or two

David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Linux

Getting into Linux can be difficult at times. Okay, the GUI implementation these days is fantastic, with many programs never requiring the user to drop into the Terminal at all, but therein lies a problem. Although the Terminal can be something of a scary place to the uninitiated, it is without a doubt the most powerful interface you're going to have with Linux.

Learning the intricacies of the Terminal and all its weird and wonderful commands will certainly make you a more knowledgeable Linux user and will go a very long way to helping you find solutions for any problems that crop up. The problem, of course, is trying to work out what all those commands do and how to use them.

Consulting the Man is certainly one method, but it doesn't always read very well and is enough at times to confuse even the most experienced of Linux users. So how about a nice, easy-to-read Cheat Sheet to have lying around for reference?

This one by 'William Hackmore' in particular is rather good: **goo.gl/FuFjy**. It's a 500-line printable sheet, which contains a number of commands that the average user will likely come across, although it's not completely functional for non-Debian systems.

This next cheat sheet, from FOSSwire.com, is an excellent, one-page printable reference that would make an ideal desktop companion. It contains commands for both Debian and other systems and can be found here at **goo.gl/P2qYH**.

More Cheat Sheets...

Moving on from the above, we have the Linux Bash Shell Cheat Sheet, which can be found at **goo.gl/AOrI6H**. This is an interesting PDF that contains many basic commands that will work with pretty much every distribution going, with a few entries that are Debian specific.

> "The Terminal can be something of a scary place to the uninitiated"

It's well written, contains the commands and what they do, as well as a few real-world examples for their use.

If you require something a little more specific or something for the more experienced user, then Nix Tutor may have the answer. Head to **goo.gl/ae487O** and feast your eyes on this collection of Linux cheat sheets that cover the command line, Linux security, administration, Gnome/KDE, sed/swk/vim and other tools, and even a couple of distro-specific references to browse.

There's a fair amount in here to get through, so I'm fairly certain you'll find something within the list to satisfy your curiosity or search for the ultimate in Linux knowledge.

Finally, Cheatography has a Linux cheat sheet among its collection of many, by Dave Child. You can find it at **goo.gl/oY8BYJ**, and as you can see, it's really very good, well laid out and easy to read.

However, Cheatography also allows you to create your own cheat sheet – and not just for Linux either – so if you feel you can put one together yourself or one that caters for a different level of user, then go ahead and please let us know when you're done so we can share it with the other readers.

Amiga30UK Part 3

Sven Harvey rounds off his visit to the UK's 30th anniversary event

After Hyperion Entertainment left the stage at the Peterborough Marriot hotel, Cloanto's Michael Battilana came on. Cloanto is the company behind the development of Amiga Forever, C64 Forever and a rather major part of the worldwide effort to preserve digital culture for future generations, be that in the form of games, applications or scene demos across all the major formats but with the Amiga being a focus. Cloanto also put funds into the development of UAE (the emulation software), which forms the core of Amiga Forever along with the officially licensed operating systems.

François Lionet then took to stage with his dynamic and brilliant presentation about AMOS, which he wrote for Mandarin/Europress Software after the success of STOS, and was followed by Two Lemmings and a Superfrog or in the more common vernacular, Tim 'CoLD StoRAGE' Wright, Mike Clarke and Allister Brimble. The trio of musicians spoke about how they became musicians within the industry and the rather central part that the advent of the Amiga took in their journey, with Allister working on Team 17 games (and many other titles) while Tim and Mike worked at Psygnosis both pre- and post-Sony buyout, and shared photos of the company.

During a break between the 'day events' and the dinner/evening schedule, as the room was reset and musical equipment set up, the raffle was drawn for the plethora of great prizes Steve and his team had accumulated – though I was half expecting the musicians who were present to win their own CDs back on more than one occasion!

When we returned to the room, dinner was served, while we had the joy of listening to R J Michal from the original Amiga development team tell us stories and little info nuggets from his time with Amiga, Commodore and working on the Epyx Lynx (which ended up being an Atari product), followed by a quick question and answer session.

David Pleasance auctioned off an Amiga CD32 signed by the VIPs, as well as a couple of rare T-shirts from the Commodore UK days, his own invite from the CD32 launch and a CD32 launch branded pen originally owned by Dawn Levack, of which only two exist – the other being in the ownership of Chris Evans, who hosted the launch.

Mike Montgomery of The Bitmap Brothers and Jon Hare of Sensible Software fame took to the stage to talk about their Amiga days and the instances where they worked together.

I have to admit that the next (and final) two segments of the event were perhaps my favourite. Tim Wright and Mike Clarke took to the stage to provide us with musical entertainment, which included, as Tim later put it, the earworm that is 'A Certain Kind Of Pursuasion', written for the event using only the samples form the ST-01 floppy that came with the Amiga music tracker Ultimate Soundtracker, as well as Tim's remix of Romeo Knight's Cream Of The Earth from the scene demo 'Cebit '90', as well as music from *Lemmings*. At the end of the set, Tim auctioned off the high-end Casio keyboard used during the set in aid of the event charity Children In Need, only for Allister Brimble to be the highest bidder, which was just some kind of weird sight, seeing the handover and Allister having a play...

Jon Hare then took to the stage with partner in audio crime Andrew Barnabas and provided us with more musical wonder in the form of Sensible Software's music from *Microprose Soccer* and onwards, including two tracks from *Cannon Fodder*, with the main theme, also known as 'War (Has Never Been So Much Fun)' rounding off the event.

All in all, it was a fantastic day, and Steve and his team can feel very accomplished. Just looking around the room and seeing a good chunk of the people who made the Amiga what is was and the huge amount of passion for the platform was hugely refreshing. I hope we see its like again!

Links

Amiga30UK YouTube channel (presentations as they are edited for release): goo.gl/mt1EvW
Ravi Abbott's YouTube Channel (multiple interviews): goo.gl/nvl6P2
Dan Wood's YouTube channel (multiple interviews): goo.gl/Tviko9
Tim 'CoLD StoRAGE' Wright: www.coldstorage.org.uk
Mike Clarke's on Soundcloud incl. 'A Certain Kind Of Pursuasion': soundcloud.com/mike-clarke

Sven Harvey has been our Amiga specialist for over 16 years, drawing on his 25 years retailing computer and video games and even longer writing about them

Amiga

Second Chance

Ian McGurren finds out if the Galaxy Tab S2 rights the S's wrongs

Ian McGurren is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

2014 saw the release of some impressive tablets, from Sony's Z3 compact tablet, to the improved iPad Air 2. But if there's one device that consistently caught the eye, it was Samsung's Galaxy Tab S line and their stunning QHD Super AMOLED screens – arguably the sharpest and most vivid screens available.

It seemed that with the Tab S, Samsung had finally hit paydirt and had released a device that could compete – and even exceed – Apple's iPad Air 2. Light? Check. Attractive design? Check (as long as you like dimpled back covers anyway). Powerful? Octocore as standard. Good screen? No, not good, but the best in class. It even utilised the AMOLED screen to create a monochrome ultra low power mode. Let the battle commence...

But the Tab S wasn't all perfect. Mostly to blame was Samsung's overbearing TouchWiz user interface, the bane of most Samsung Android hardware. There were stutters, slow reaction times, very warm processors, and even if you wanted to flash a more vanilla ROM, Samsung's Knox encryption meant that if you did, you could kiss your warranty goodbye. So it was close but no e-cigar. But, as sure as paparazzi follow Kardashians, 2015 was to see the release of an updated model, the cleverly named Galaxy Tab S2. Can Samsung fix the S1's mistakes?

A little lost in the Galaxy Note 5 / S6 Edge Plus launch hubub, the S2 has been announced and shown off, and straight off the bat, there's a big change. Samsung has often been accused of 'borrowing' from Apple, and really the Tab S2 isn't going to change that, as both the 8" and 10" (well, 9.7") versions now have 4:3 ratio screens, much like their Apple rivals. This is a choice that splits many, especially as 4:3 is an old TV-style ratio, in a 16:9 widescreen world. However, personally I far and away prefer 4:3 for tablets; widescreen is fine on phones but feels odd and elongated, especially with ebooks. The resolution now matches that of the Retina screens but remains Super AMOLED and therefore bursts off the screen. Accurate it isn't, but gorgeous it certainly is, even with the slight drop in screen density (9.7" is 264ppi versus 10" 282ppi, 8" 320ppi versus 8.4" 359ppi)

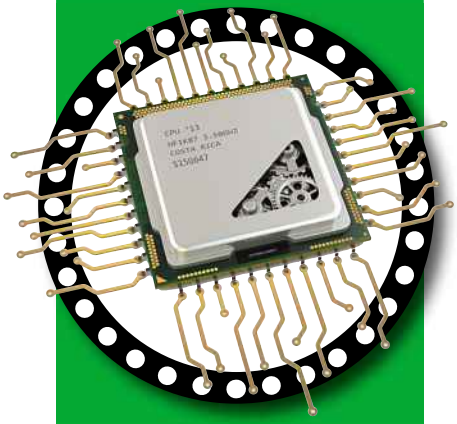
Beyond the screens, the Tab S2 makes other improvements in hardware. It has made an already light device lighter by around 20g. The processor(s) are the same split 4+4 pseudo octacore setup, but this time are an Exynos 5433 SoC, with a 1.9GHz quad-core Cortex-A57 and a 1.3GHz quad-core Cortex-A53 – more Note 4 class than S6 class but around half as powerful again as the Tab S. RAM, however, is unchanged at 3GB – plenty for Android M, but with other Samsungs going for 4GB, it's a bit disappointing. Also staying the same is the 8MP camera, though you can now film in 1440p, if that is your wont.

Android 5 is available out of the box, although as this device is being released somewhat late in the Android cycle, that's not really a big deal. It's also near enough to the release of Android M for it to be an annoyance, though it's rare Samsung would release a device with the freshest iteration of Android anyway, often taking four to five months for beta ROMs to begin appearing. TouchWiz has been pared down a bit, though it's still nowhere near as unbloated as vanilla Android. But if you want some of the more useful features, including a now robust split-screen feature and the ultra low power mode, you'll need to stick with it.

The Galaxy Tab S2 is a better device than its predecessor, as it should be. Going 4:3 is a gamble for Samsung, but even it is realising that tablets benefit from this wider ratio for consuming text and images. It could well be the best Android tablet of 2015, even if it's not Samsung's best device.

Mobile

Thinking Thermostats



Andrew Unsworth continues his quest to make the Micro Mart Shed a little more sentient

Following on from last week's column, let's take a look at some of the many smart-home products on sale. To recap, I mentioned that I'm underwhelmed by smart-home technology and just can't get excited by it, even though I know I should be raving about it. Smart homes are surely the stuff of dreams, and more and more manufacturers are making smart-home devices, so there must be something in it. I'm sure there are smart-home devices out there for me, and I'm determined to find them.

This week, I'll take a look at Nest's smart thermostat. Available from a variety of stores, from John Lewis (**tinyurl.com/ob5pug2**) and Screwfix (**tinyurl.com/o77qo5k**) to the Nest website itself (**nest.com/uk**), the Nest Thermostat costs £179 and is the kind of thing that doesn't sound particularly interesting but could potentially save you money on your energy bills. That's money that could be spent on computer components and peripherals instead. Indeed, the Nest website says that over "60% of your energy bill goes to heating your home", so having precise and easy control over your heating should make good economic sense. I haven't used a Nest Thermostat, so I can't give an appraisal of its qualities, but I can report its specifications and what it claims to do.

The Nest Thermostat controls the temperature of your heating like any other thermostat, but what makes it different is the way it learns your preferred temperatures and can run your heating system at a low temperature when you're at work or otherwise away from home. If you like to have the heating set to 22 degrees in the morning and 19 degrees in the afternoon, for example, it should learn this and automatically set itself to these temperatures. Apparently, it'll work out ways to improve your energy efficiency too, and 'challenge' you to set it at a lower temperature than usual.

Once it's learned your preferred temperatures, the Nest Thermostat creates a schedule that it follows, and this schedule won't be upset by the odd change you make. This presumably means you can increase the temperature on an unusually chilly day without ruining your typically mild heating schedule.

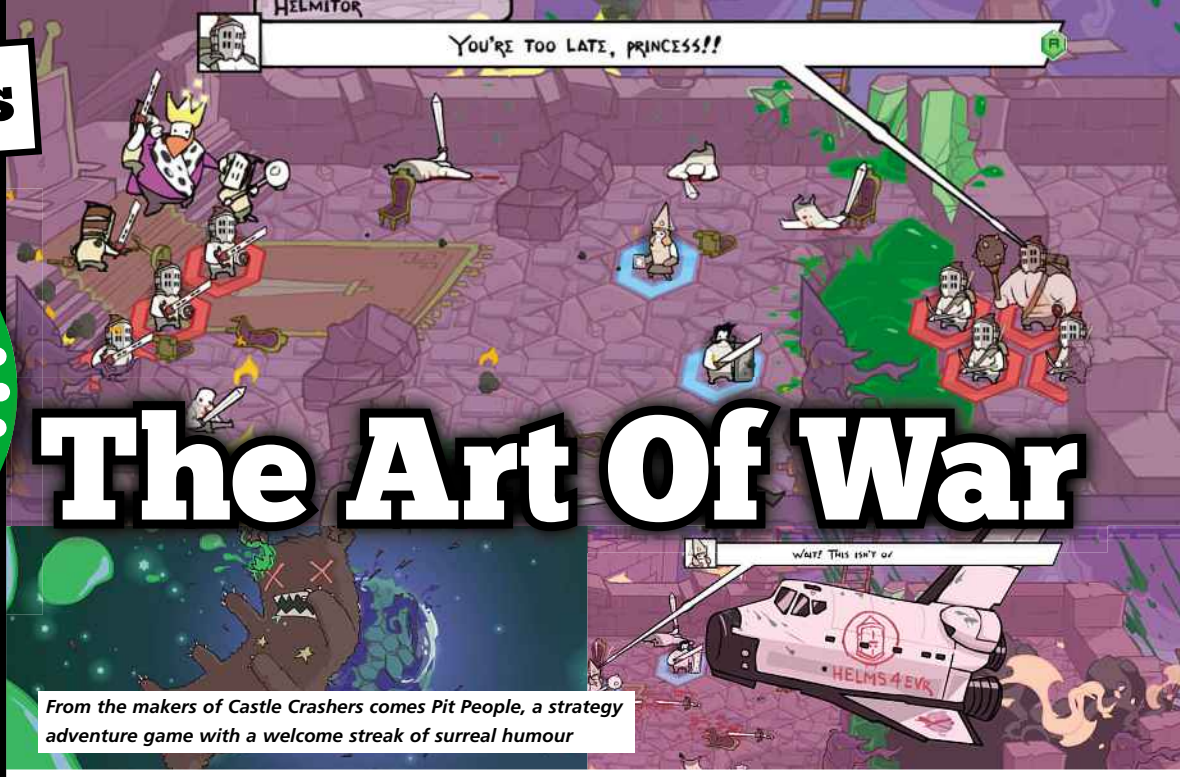
As you'd expect, the Nest Thermostat can be accessed and controlled with an app, which is available for Android and iOS devices.

The Nest Thermostat website says the system will work with almost any central heating system. The system must be fitted by a Nest-trained installer, who fits the Heat Link (a box connected to your heating system that switches it on and off) and the Thermostat itself. The Nest website provides details of trained installers.

The Nest seems like a neat system, but is it for me? I'm always warm, so I only have the heating on in the dead of winter, and only then because my family complains if they get frostbite. I like the idea of the Nest, and it certainly looks discreet and unobtrusive, but I'm not sure it would suit me at the present time. If you have first-hand experience of the Nest Thermostat or any other smart heating system, we'd love to hear from you in our letters page.

Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none

Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*



From the makers of Castle Crashers comes Pit People, a strategy adventure game with a welcome streak of surreal humour

The Art Of War

This week, Ryan takes a look at a new strategy game from the makers of Alien Hominid and Castle Crashers, and checks out Cliff Bleszinski's latest shooter...

Plug & Play

In a fickle industry where one poorly-received game can spell the end for smaller studios, The Behemoth has thrived for more than a decade. It's done so by creating simple, yet distinctive, games that overflow with creativity and anarchic humour; *Alien Hominid*, a frantic and very tough 2D run-and-gunner, established the studio's style. Subsequently, *Castle Crashers* married artist Dan Paladin's bold, colourful character designs with the old-school scrolling brawler genre, while 2013's *BattleBlock* Theater was a chunky, vibrant co-op platformer.

The Behemoth's genre tour continues with its latest game, *Pit People*, a turn-based strategy adventure stuffed with the studio's surreal humour. As far as we can work out, the story goes something like this: you play a humble blueberry farmer named Horatio, whose humdrum existence is changed forever when a small army of villains attacks his homestead. Horatio manages to fend off the aggressors, but then a giant bear's foot comes out of the sky, which destroys his house with his young son still inside it. Horatio – and therefore the player – goes off on an adventure across a very weird landscape, helping beleaguered royal families defend their castles and gradually building up his own army of eccentric warriors.

In other words, *Pit People* isn't quite your usual fantasy adventure game. Its story is comic, yet occasionally quite dark, and its turn-based combat fast-paced and yet deceptively deep. Indeed, this is arguably the most expansive, complex game The Behemoth has produced to date.

We can also see the humour in its characters having a real impact on our connection to the game, too: take Pipistrella, the queen who asks you to help her defend her castle. She soon turns out to be handy in her fight herself, as she wields a mace that's larger than her body. Or consider Yosef, the blonde, axe-clutching Cyclops who joins your party around 10 minutes into the game. It's touches like these that turn generic units into bold and likeable characters, and we can imagine that losing them in the heat of conflict will bring with it a real pang of sadness.

Each unit is also customisable; The Behemoth demonstrated in a February development post that a vampire character can be dressed up with a pair of goggles and a back pack, or maybe a fetching tiara. A healer unit – which happens to be a sentient cupcake – can also wear a variety of hats and hairstyles.

Pit People's fun and comical, certainly, but what we've seen so far hints at a game with real depth and challenge beneath its approachable surface. A release date hasn't been announced as yet, but we're looking forward to seeing more from The Behemoth's latest venture very soon; with the single-player mode set to be joined with a co-op mode and two-on-two multiplayer battles, it's shaping up to be one of the most promising indie games on the horizon.

You can find out more by visiting **www.pitpeople.com**.

Online

The announcement of yet another class-based, free-to-play multiplayer shooter wouldn't normally leave us clutching our pearls with excitement, but *Lawbreakers* has a particularly strong pedigree. This is the game formerly known as *Project Bluestreak*, and the first game from Boss Key Productions, the studio set up by former Epic Games developer Cliff Bleszinski. In other words, *Lawbreakers* has the designer behind such games as *Unreal Tournament* and *Gears Of War* behind it, which means

▲ *Yes, it's another free-to-play multiplayer shooter, but it's from the designer of Unreal Tournament so Lawbreakers could be quite exciting*

it's undoubtedly worth a look – even if our first impressions of the game leave us with a distinct feeling of deja-vu.

Lawbreakers is set in the 22nd century, after an event called The Shattering changed our planet forever: the old-fashioned laws of gravity no longer apply in quite the same way, which means that warring armies of high-tech mercenaries can zip around the place using jet packs, grappling hooks and other high-tech modes of transport. The strands of DNA from the *Unreal* series can be readily seen in Lawbreaker's reveal trailer (**youtu.be/RJ4S5G4nsUI**); the action is fast-paced, athletic, and the time-honoured rocket jump even makes a brief appearance.

That first trailer also shows off four of the game's multitude of classes. There's Kistune, an assassin whose speciality is a *Super Mario*-like double jump. There's Breacher, a gunner who, in an intriguing twist, can shoot behind him as he runs away. There's Maverick, a skirmisher who wears a jetpack. Cronos, meanwhile, is a titan-class warrior whose lack of stealth is balanced by the rocket launcher he carries in his hulking fists.

If there's a problem with *Lawbreaker*, it's that its design and play mechanics don't look hugely different from a legion other shooters. *Titanfall*, *Team Fortress 2* and, yes, *Unreal Tournament* all spring to mind, while the sci-fi environments and characters recall another major shooter currently in the works: Blizzard's *Overwatch*.

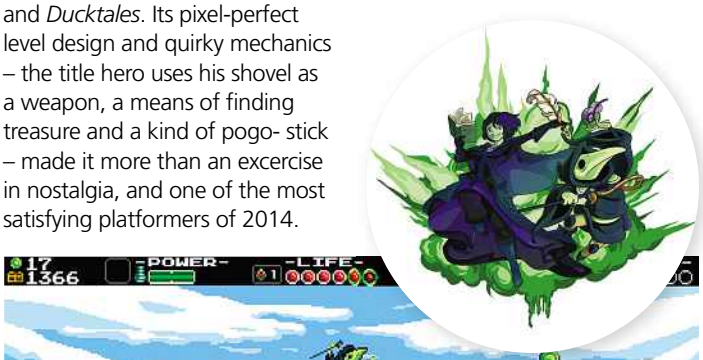
Lawbreakers does, however, have much in its favour. Boss Key's partnership with free-to-play specialists Nexon means its technical underpinnings should be solid, while Bleszinski's track record suggests that even if it doesn't break the mould, it should still provide plenty of white-knuckle entertainment. The Breacher's ability to blind-fire over his shoulder is an example of a small innovation that could really change how the game's played, and with more neat touches like this, *Lawbreakers* could prove to be a winner. We'll only know if it hits its loosely scheduled launch, pencilled in for 2016.

Incoming

Shovel Knight was an adorable love letter to an 8-bit era of 2D platform games like *Mega Man* and *Ducktales*. Its pixel-perfect level design and quirky mechanics – the title hero uses his shovel as a weapon, a means of finding treasure and a kind of pogo- stick – made it more than an excercise in nostalgia, and one of the most satisfying platformers of 2014.

If you've already completed *Shovel Knight*, there's great news: its developer, Yacht Club, is preparing to release a free update. *Plague Of Shadows* will allow you to play through the game as the erstwhile villain Plague Knight, whose attacks and abilities completely change the way *Shovel Knight*'s played; he can fire magical projectiles, which can vary from bombs to spells depending on what items you have. Crafting and alchemy elements will add a new layers to the game, while existing stages will be given a new lease of life.

It's refreshing to see a game get such an expansive free update, and Yacht Club reportedly has more updates planned for the future. *Plague Of Shadows* is scheduled for release sometime in the autumn. If you haven't played *Shovel Knight* before, it's a great excuse to give this lovingly crafted platformer a try.



▲ *Shovel Knight's getting a free update called Plague Of Shadows. It's a great excuse to return to one of the best platform games of 2014*

AD INDEX

2/3 CCL

6/7 Morgan

11 WaveWall

17 Computer Orbit

21 Falcon Computers

25 Laptop Screen

27 Transcend

29 Epsilon

33 Y-Cam

35 1&1

29 Epsilon

25 Laptop Scre[illegible]

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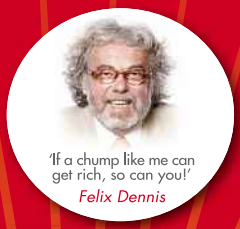

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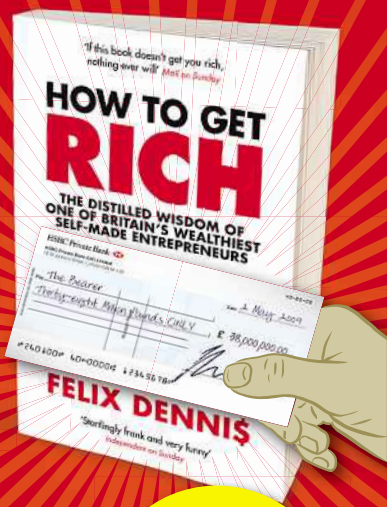

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IBM/LENOVO SFF BASEUNIT. P4/ 2.8 H-T, 2GB RAM, 40GB Hard Drive, CD-Rom, 10/100 Network, sound, USB, Clean install XP-pro, fully updated, Office Suite, Anti-Virus, & all usual utilities, COA Licence Sticker & Install media, £25
Tel: Pat (07710) 348638
Email: pat4cars@aol.com

FUJITSU-SIEMENS MINITOWER. Pentium D 2.8 Dual-Core, 2GB RAM, 80GB Hard Drive, DVD-RW, Gigabit, sound, Clean Install XP-pro, fully updated, Office suite, Anti-Virus & usual Utilities, Legal COA sticker & System Image. £35
Tel: Pat (07710) 348638
Email: pat4cars@aol.com

DELL OPTIPLEX GX240 SFF. P4/1.6, 20GB hard Drive, 768MB RAM, CD-Rom, 10/100 network, Sound, Front USB, Clean install XP-pro, fully updated, works OK but slow by modern standards, £15.
Tel: Pat (07710) 348638
Email: pat4cars@aol.com

56kb Fax Modem External. £10.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

LG Flatron W2246S 22" monitor with power and VGA leads. No dead pixels in very good condition. £50 Buyer Collects (Verwood, Dorset)
Tel: (01202) 826057 Email: geoffandcynth@themailspot.com

2x 1GB PC2100-648. These two matched sticks were removed from one of my redundant systems. Plus one PC2700 (DDR 333Mhz) and one 512Mb PC3200 DDR400 stick. All for £5 plus £2 P&P.
Tel: Alan (02084) 202322
Email: alan@asandco.co.uk

Very rare Viking IBM 16MB Dram Card (15109 66G5109) for Compaq, IBM Thinkpad, Etc Laptop Only £20
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

TP-Link 54Mbps 4-port Wireless G Router. Perfect, boxed. Model: TL-WR340G. £20 plus postage.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Intel Core 2 Duo E4600 3GHz 775 Socket Processor. Tested and removed from a working environment. £10 inc Free Courier. Payment via PayPal.
Email: info@jmcomputing.info

Addon Wireless LAN USB 2.0 54Mbps 802.11g Adaptor. Boxed w/ manual and software: £9.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

CD Stomper CD/DVD Labelling System: Software, Labels and Label Applicator. Boxed. Unused. £9.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

DIR-615 Wireless N Router. Boxed, brand new. £30.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

2x 120GB Maxtor DiamondPlus 9 Drives plus 1x 80GB DiamondPlus 10. Can be supplied with 2x plug-in caddies. Reasonable offers please.
Tel: Alan (02084) 202322
Email: alan@asandco.co.uk

HP Elitebook 8760w i7 2820QM @ 2.2GHz 32GB RAM 750GB HDD Quadro 4000M GPU. Only 2 small marks on whole machine. Cost £3500 when new. £900 ONO
Tel: (07772) 926632
Email: stedaley19@gmail.com

WD 2TB desktop HDD. Formatted ready for an OS. Runs very nicely. New laptop means desktop items must go! £40 inc. tracked postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

Toshiba C500D-B-11 laptop. Almost new cost £279 will accept *£150ono*
Tel: (01217) 535324

Intel 3930K processor. Used, but not overclocked. No box or fan. £220 ono. Will ship to UK address.
Tel: Tim (01623) 624509
Email tim.stirland@btinternet.com.

Amstrad PcW 9256 in good working order with software. Offers.
Tel: John Adams (02088) 641202
Email: meeching@uwclub.net

Asus P8Z68-v LX socket 1155 motherboard. Original box 1/0 cover user guide driver disk fitted core i3 2100 CPU 3-1GHz and 8GB PC1300 memory. No fan. Working fast and fine. £125 + free postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

HARDWARE WANTED

Trying to breathe life back into an old machine? Why not submit a wanted ad and see if any of the thousands of computer enthusiasts who read the magazine each week have what you're looking for?

WANTED: PC Tower case (beige colour if possible) to rehome an Amiga A1200 vintage computer. The Amiga motherboard is H 410mm x L 190mm (H 16" x L 7.5"). PSU not an issue but if available 250 watt more than enough.
Tel: Bill (07742) 061569 or (02641) 769503.

WANTED: Fractal Design Define XL full tower case. R1 (original version) in black.
Tel: (01670) 860146
Email: mm@tectron.co.uk

WANTED: Working Dot Matrix Printer in Good Condition. Thanks!
Email:
printer.20.odaily@spamgourmet.com

WANTED: Acorn computer either an A5000 or A7000. Also book on teaching yourself binary.
Tel: (07817) 861011
Email: Johnhaviland73@gmail.com

SOFTWARE FOR SALE

Do you have old software that you simply don't use? Why not advertise with us?

Adobe Photoshop Elements and Premiere Elements 12 Full Version - Windows/Mac. Original Boxed CD with unused product key. £47.50
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

PCB design software 127 layers, schematic entry, PCB entry, PCB to Gerber file converter, output to printer. £9.99
Tel: Nigel Wright (07967) 527693
Email: cresswellavenue@talktalk.net

Cyberlink PowerDVD 12 Standard. Runs under Windows 8, 7, Vista or XP. Original CD with unused product key £7.50
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Microsoft Office 2013. Original Software only £100.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Sim City 2000. Boxed and original. Classic gaming. £15.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Norton Family Premier 2.0. Runs under Windows 8, 7, Vista or XP, Original Symantec unused product key £15.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Nuance Omnipage 18. OCR for Windows 8, 7, Vista or XP, Original CD with unused product key £25.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Acronis True Image Home 2012. Bootable CD. Application runs under Windows 8, 7, Vista or XP. Original Acronis CD with unused product key £5.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

SOFTWARE WANTED

Wanted: Windows XP SP2 or Windows 7. I am also looking for a boot disc for Toshiba satellite L40-18Z.
Tel: Mr Cranney (07948) 927384
Email:mcrnny1932@gmail. com

Wanted: PictureToExe software, for making picture shows.
Tel: (01202) 610602
Email: ivor.mary@talktalk.net

Wanted: Quicken 2001. I require a copy of QUICKEN 2001, UK Edition. I need to reinstall the program, but have lost my original installation CD.
Email: david.maddams@icloud.com

IMPORTANT BUYING ADVICE

We work very hard to police our classified ads, and make them as secure as possible. However, please do your bit too and use the following guidelines:

• **Never - NEVER -** pay by bank transfer or post out cash, unless you know the trader already, or are sure it is okay to do so. Pay by cheque, Paypal, Nochex etc wherever possible.

• Be wary of anyone who insists on you paying by the above methods if in doubt, get us to check them out by mailing editorial@micromart.co.uk

• Keep copies of all correspondence

• When sending out goods, at the least obtain a certificate of posting from the Post Office

If you are in any doubt, feel free to send us a mail via editorial@micromart.co.uk.

Every year, thousands of successful transactions take place through our classifieds, and that's just how we like it.

Help us help you keep them one of the safest and most secure places to buy and sell computer kit.

ASK AARON

Meet Aaron Birch. He's here to help you with any general upgrading, software and system building problems. He's got advice aplenty, and you're very much welcome to it!

Send your questions to:
Aaron Birch
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Aaron by email at:
aaron@micromart.co.uk

Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

Aaron

Still Quicken

I have been a long-term subscriber of Micro Mart since the early days of DOS, and I would like to thank you and your colleagues for the very informative articles that you continually produce.

Currently, I have a problem that I would like your advice on.

I have an Asus 5750 laptop, which has Windows 7, 64-bit Home Premium installed. The laptop has an Intel i5–2430m, 2.4GHz processor with turbo boost to 3MHz; a 1000GB hard drive, a 15.6" HD LED screen and an Intel HD graphics card.

I wish to donate this laptop to a friend, but my problem is that I currently have and use a historic program (Quicken 2001) installed on this machine. I propose to remove the hard drive complete with the Quicken program and data and replace it with a new hard drive. I would then reinstall Windows 7 onto the new hard drive and give the laptop to my friend.

My real question is, could I still access the Quicken program and data on this original hard drive by putting it into an external hard drive caddy, then plug it into a USB socket on another Windows 7 laptop? It seems crazy in this day and age that there isn't a similar program to Quicken that carries out the same functions as Quicken 2001 did. There are a number of similar programs that deal mostly with household bills, but there seems nothing that deals with managing investment portfolios, the same that Quicken 2001 did. As I have now mostly migrated to a MacBook Pro for my day to day needs, I would prefer an OS X program but failing that a Windows program. Your help in resolving these two problems would be appreciated.

David

Removing a hard disk from an old PC and slotting it into a new one can sometimes work, and occasionally programs can still be accessed, but this really depends on how they're installed. If a program creates various system-level links and registry entries, which they almost always do, you'll probably run into problems, as your copy of Windows will not have the relevant files and install references the program needs to run. As you'll be removing the drive anyway, there's no reason not to try it, but I suspect Quicken will be missing various installation entries and won't run.

If you still have the installation media, it's worth trying to install it again on your new PC. If you experience any problems, try running the app in compatibility mode. I doubt the program will run properly, as it's a much older release, but it's always worth checking, especially as it suits your needs.

*I'm certainly no expert in finances or investment portfolios, but I can suggest a couple of alternative programs you may want to consider. First, you may want to have a look at AceMoney (**www.mechcad.net**). This is a cheap and well-received financial package that's available for both Windows and Mac, and there's a free trial version you can have a look at to see if it has the features you need. Alternatively, you could try the free, open source GNUCash (**www.gnucash.org**). This is cross-platform, so will work on Windows, Mac and Linux, and should be powerful enough. As it's free, you lose nothing by giving it a go.*

*Finally, I'd suggest iBank (**www.iggsoftware.com**). This is a Mac-focused app, which would be suitable for you with your jump to the Mac, and it's a powerful package that's used by a lot of people who have migrated from Quicken.*

▼ *iBank is a good finance package for the Mac*

Frozen SSD

About a year ago, I upgraded my self-built PC to use a Samsung SSD 840 120GB as the main boot drive. Samsung Magician and Intel Rapid Storage Technology both report that the drive is running normally and has the latest version of the firmware, but since installation I have had problems with the system freezing at intervals.

The keyboard and mouse become completely unresponsive, and the only way out is to press the reset button. It happened a lot when I first installed the drive, then things seemed to settle down, but lately it occurs nearly every time I use the PC, usually within five to 15 minutes of start-up. There's no warning or error message, and it doesn't seem to be related to any particular program; the PC froze once when the system was idling on the desktop and another time in the middle of a Windows Update. The drive is not full, as I store data on a separate drive.

I have tried searching the forums, and although I found plenty of evidence of other people with the same problem, there were no definitive solutions, so any advice you can offer would be welcome.

The system specs are as follows:

Motherboard: Gigabyte GA-Z77-D3H
CPU: Intel Core i5-3570K
RAM: 16GB G.Skill Ripjaws
OS: Windows 7 Ultimate

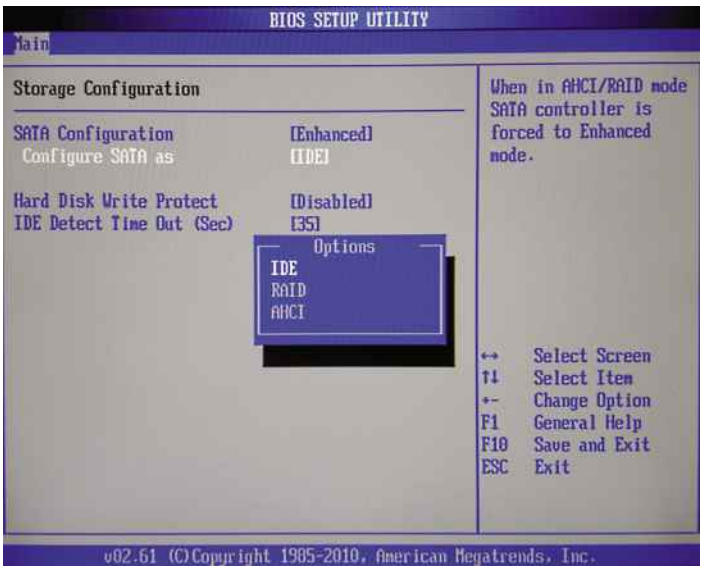
Susan

There's a lot of advice floating around about this, as you've no doubt already seen on your travels. Many people have this problem and seem to solve it using various different methods. As is all too common, what works for some people doesn't for others, so it can be hard to fix. This is especially so with instances of freezing PCs. As there's no actual error message, it can be very hard to narrow the possible cause down.

So my first piece of advice is to try to figure out what may be causing it, if possible. By this, I mean having a look at the Event Viewer. To get to this, right-click My Computer/Computer and select Manage. Expand Event Viewer and have a look at the various Windows logs, focusing on any times you know the computer has frozen. This may give you some insight regarding what may be causing it. Also, if possible, I'd try to remove the new SSD and replace your old drive(s), running the PC with them to see if the problem still occurs. If it only happens when the SSD is fitted, you at least know it's something to do with the SSD.

Assuming the problem does lie with the SSD, I'd highly recommend the usual checking of drivers, not just for your SSD, but also for your PC's own BIOS, as well as any other drivers. It's best to be certain. You may not think an unrelated driver could cause a problem, but you just never know.

SSDs are great, but if you have problems, they can be troublesome



AHCI SATA drivers can cause problems with some SSD installs, and switching back to IDE can help

Power cycling a system can help too. By this I mean fully powering down and unplugging the system, removing the SSD, reinstalling it, and then powering back up. While the system is powered down, also take the time to remove and reseat your RAM and other PCI cards, just in case. Ensure the innards of the PC are clean and fans are not clogged, to eliminate basic heat problems. Power the system back up afterwards and give it a go.

If the problem persists, it's time to take some more serious measures, with one of the remedies I myself have used in the past for similar cases. I suspect your PC's SATA will be set to use AHCI drivers. These have been known to cause problems, especially with some SSDs, so we need to change this. Go into your BIOS and locate the AHCI setting and change it to IDE. This will then force the system to use the older IDE device drivers, and this will likely solve your problem. AHCI is better overall, and SSDs will function better, plus it also has some extra features IDE doesn't have, but it's really nothing you'd miss all that much, and a system that doesn't freeze all the time is more desirable than any benefit AHCI will deliver.

“Power cycling a system can help too. By this I mean fully powering down”

Of course, we also can't rule out the most glaring possibility, that the SSD drive is faulty. It's rare that a new drive will be faulty, but it's still a possibility, so if the unit is still under warranty, it may be a wise first step to get a replacement, as this could save you a lot of messing around. You could even try the drive in another PC if you have one available, to further test the drive itself. Good luck.

ASK JASON

Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
Jason D'Allison
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

Recovery Position

I recently had cause to use a restore point in Windows, but the process failed. I then tried a recovery disc I'd created some while back, but the PC locked up at the language selection stage, with both keyboard and mouse unresponsive. Exactly the same thing occurred when I then had a go with my original setup DVD. Help! What should I do now? The PC's specs are below.

CPU: AMD A6-5400K (3.6GHz, dual-core)
Motherboard: Asus A88XM-A
RAM: 8GB DDR3
GPU: Radeon HD 7540D (integrated)
HDD: 1.5TB
OS: Windows 7 (64-bit)

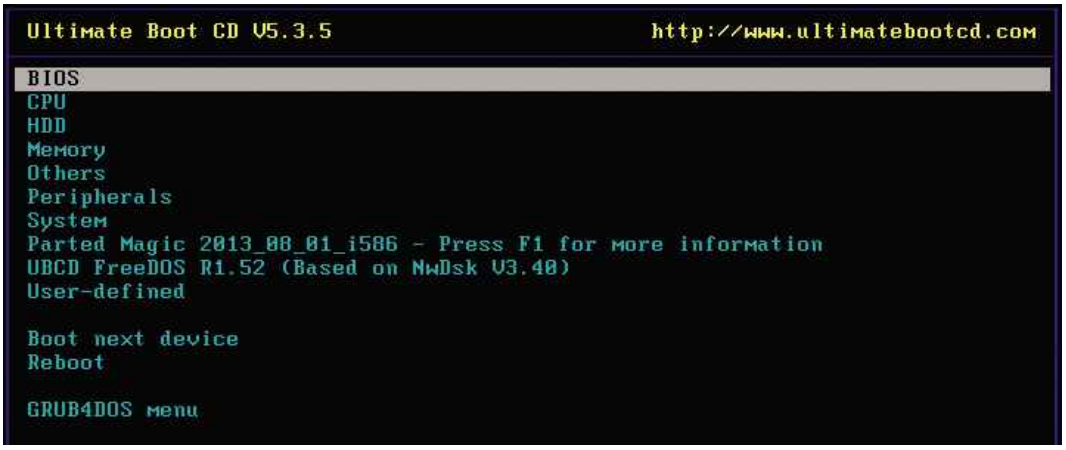
Mike Cahalane, BT

As three different approaches to restoring and reinstalling have all met with failure, I reckon there's a hardware problem. Ordinarily I'd suspect the motherboard, but if that were the culprit here, I'd expect the symptoms to be random. Because you're seeing the same lock-up in the same part of the process, I'm instead inclined to point the finger at a bad sector on the hard drive or a faulty address range in RAM.

To get a handle on things, Mike, download a copy of UBCD (the Ultimate Boot CD): ***goo.gl/ilmXaL****. Burn it to a CD as an image (not as a regular file), boot up your PC with it, and dig out the following two utilities: Memtest86+, to give your RAM a workout, and ViVARD, to scan your hard drive.* If any errors crop up (I think they will), you can then crack open the piggy bank and order any necessary replacement parts.*

Regarding ViVARD, the best option is 'Erasing sectors or whole drive', which invokes a full read-write scan. This will wipe all data. If you don't like the sound of that, choose 'Surface test', which invokes just a read scan. This is usually enough to identify a drive that's obviously pretty poorly, but be aware that a drive with only write issues might still be given a clean bill of health.

** If you prefer, you can boot UBCD from a USB stick. Instructions are given on the page linked to above.*



It might look like something from 1985, but UBCD is as invaluable in 2015 as it's ever been

Bits And PCs

This week I have been mostly...

...reading *Animal Farm* for maybe the 50th time (while on holiday I bought a battered old paperback at a charity sale on Brixham harbour).
...playing *Yoshi's Woolly World* on the Wii U (I'm a sucker for any Nintendo franchise).
...watching a couple on *The Link* being told they were wrong because they guessed that 'mammoth', 'enormous', and 'huge' were synonyms for 'big' when the correct answer was they were synonyms for 'large' (I've just three things to say about that – WTF?!).
...listening to the fan on my daily-driver laptop going hell for leather (time to open her up and sort out the cooling – again).
...wondering if I should continue my monthly Office 365 subscription or just buy a Windows tablet for similar money and get Office 365 for free (for a year).

Even when you're right, you're wrong

Pain In The Glass

I'd like to go for the free upgrade to Windows 10, but if I do, I also want to keep my existing install of Windows 7. Basically, I don't actually want to upgrade. My plan is to buy a new drive, install and activate a fresh copy of Windows 7 on it (using my retail product key), and upgrade to Windows 10 from that. This would keep my 'real' Windows 7 install nice and safe on my existing drive. Would this work?

Graham Dearsley, Outlook.com

The free upgrade to Windows 10 is just that – an upgrade. You need an activated Windows 7 or Windows 8.1 installation already in place, and once Windows 10 itself is activated, your licence for the previous OS is revoked. There's a one-month roll-back option if Windows 10 proves not to be your cup of tea, but ultimately, Graham, you can keep only one OS or the other, not both.

During activation of a Windows 10 upgrade, Microsoft takes a fingerprint of the host PC, meaning future reinstallations don't require a product key or previous OS and are activated automatically (once the PC's online). Does this fingerprint include the previous OS's product key? I've not put this to the test. If it does, your Windows 7 key will be effectively blacklisted, killing your plan dead.† If it doesn't, using the previous OS will be possible but illegal.

Really, to proceed as planned, you'll have to actually buy Windows 10. The Home edition retails for around £80. Another option is to hunt on eBay for a broken laptop or tower with a readable Windows 7 product key. About £30 should see you right. You could then use that key to implement your plan on the new drive (a call to Microsoft's activation line may be needed) and leave your 'real' Windows 7 installation legal and untouched.

† On a PC sold with Windows 7 pre-installed, the product key used for initial activation will have been a generic, volume affair. The key on the sticker will be completely different. This won't have been logged with Microsoft (unless it's been entered during a reinstallation), so presumably it could be used without issue even after a Windows 10 upgrade. Probably not legally, though, unfortunately.

Mostly because of Microsoft's obfuscation, there's still an enormous amount of confusion surrounding the free Windows 10 upgrade

Missed Connection

I can only get an intermittent wi-fi connection on my Advent Vega Tegra Note 7" tablet. Often an app will say it's unable to connect, yet in Settings the tablet will show full signal strength. Toggling in and out of flight mode usually restores access, but only for a few minutes. Typically I'll get around 20 minutes of uninterrupted wi-fi when the tablet's first switched on, though this can reduce if there are updates going on. Rebooting makes no difference.

At purchase, the tablet was running Android KitKat (4.4.x), but a recent upgrade to Lollipop (5.1.x) hasn't improved matters. I don't think my home network is responsible, as my Chromebook has no wi-fi problems at all. Any ideas? I hope you can help, as this is making an otherwise excellent tablet largely unusable.

Susan Illingworth, Zen Internet

If other devices on the network function without issue, you can probably rule out a problem with the connection itself. It's unlikely your ISP or router is to blame. A final test would be to try the tablet on a different network – at a friend's house, perhaps. Does wi-fi still drop out? If not, there could indeed be some compatibility quirk with your router. But if it does – almost a certainty, I'd say – the problem is with the tablet.

My guess is the wi-fi module is overheating. It lasts 20 minutes before reaching a critical temperature – less when being hammered, such as during updates. Sadly, replacing the module won't be economical, Susan, as the entire mainboard would need swapping. If the tablet's warranty has expired, I fear this is something you'll just have to live with. Eventually, I regret to say, the module is likely to pack up entirely. Sorry.

Heat is the bane of all electronics

Crowdfunding Corner

You've got a smartphone, a smart TV, maybe even a smart fridge but how about a smart bike? Crowdfunding can help make it happen with these unique projects

SmartHalo

The SmartHalo is an urban-cycling add-on that can help you find the way to your destination easily and safely. By locking on your handlebars, the SmartHalo shows you the quickest, safest routes with an easy-to interpret set of lights which point the way to wherever you're going.

In addition to turn-by-turn navigation, the SmartHalo comes with an app that tracks your activity and cycling metrics (everything from speed and distance to estimated calories burned). It's got a built-in light for night use. There support for call-notifiers and weather alerts, and perhaps best of all a motion-sensitive alarm that can detect any prolonged attempts to move the bike while you're nowhere near it and triggers an alarm. A set of custom screws prevents any direct tampering, and the device itself only ever responds to your smartphone.

The SmartHalo is intended to fit on to any bike, and should ship to funders in May 2016. The popularity of the project means early bird tiers have already run out, but you can still get one for the cut-down price of $156 (£102, which includes UK shipping) and that's still £10 lower than the retail price, with the benefit of getting it first. Higher tiers largely allow you to buy multiples at a discount, so if you run a bike shop you may want to get in on those too.

URL: kck.st/1UdfFoR
Funding Ends: Thursday, September 24th 2015

FAST Tail Light

The FAST tail light provides bike-riders with a number of functions beyond simple illumination, thanks to its built-in motion detector, Bluetooth connectivity and multiple LEDs, which allow it to shine in any colour you like, from a choice of 16 million, all controlled by an app on your phone..

FAST's capabilities could even save lives. If your bike is in a serious accident, FAST's motion detectors will realise and automatically dial an emergency contact so that they can check you're okay, and get you help if you're not. Light-sensors also ensure that the LEDs activate whenever it's dark enough, so you won't ever have to worry about trading time for safety. There's also a built-in anti-theft measure that will alert your smartphone if the bike is being tampered with while you're not around.

Backers can still get a FAST light on the early bird tier of $25 (£16.30, including UK shipping); that offer throws in the mount and software for free. If you miss that, the full price is only $35 (£23, with shipping). Although none of that matters if it doesn't reach its goal of $20,000 – but it's a third of the way there with over a month to go, so we're fairly confident that it will. Again, higher tiers allow you to buy multiples at a discount. The hardware should be available to ship in November 2015, which makes for a pleasingly prompt arrival. If you want one, backing the project is the best way to make that happen.

URL: kck.st/1PN6YR2
Funding Ends: Friday, October 9th 2015

Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

Atari Arcade

A wet bank holiday calls for some classic gaming

Well, it's the bank holiday as we write, and in true British end of summer time weather it's throwing it down. In fact, we might have had the annual rainfall of the Amazon in a single hour so far.

What better time, then, to don our sou'westers and oilskins and get out for a lovely walk. Or not. Perhaps, instead, we could complain about the weather, open a window for fresh air and play some classic Atari titles? That sounds better.

Atari Arcade

Welcome to Atari Arcade, a page dedicated to bringing some of the finest Atari classics of yesteryear to your humble web browser. The online arcade can be found at **goo.gl/qNy5l**, from the main Atari.com site, and within its Internet Explorer enhanced pages you'll find such wonderful additions as *Centipede*, *Combat*, *Missile Command*, *Pong*, *Yars' Revenge* and *Asteroids*.

To play the games, all you need to do is scroll down the list (of animated Atari cartridges we might add), click on the Game Info section from the menu that appears next to each, read the instructions on what keys to use etc., then click on either Single Player or Multi-Player and the game will start to load up.

Developer Program

However, there's more to the Atari Arcade than a nostalgic trot down memory lane. If you are by any chance one of those clever people who can write code and other magical things of that nature, then drop by the Atari Arcade Developer Program at **goo.gl/oc3vy**.

The Atari Arcade uses a fair amount of advertising, not enough to ruin the game experience, but enough so that any developer who has their game added to the arcade gets a decent share in the advertising profits.

The Getting Started is particularly good, and every conceivable help is offered to those starting out, which includes examples, code snippets, techniques and information about building a game from the people who have already done so. Within the SDK you'll find all the resources you'll need, such as the game libraries and so on, which will no doubt make perfect sense to a developer, as well as some sandbox testing environments that simulate the Atari Arcade site.

There are also some Internet Explorer specific references to IE10/Edge and Windows 8.1/10 touchscreen, which basically means the games that are currently on the Atari Arcade and the ones that you could potentially develop for them are compatible.

With the aid of the Atari Arcade Software Developer Kit and a little advice from the dedicated developer forum, you can create your own HTML5 game. Unfortunately, the Atari Arcade Development Program is now closed for submissions. However, the documentation and code snippets along with everything you need to code an Atari classic are still available from the aforementioned page.

Features At A Glance

- Free online play.
- Touchscreen ready.
- Developer ready, with good instructions and an SDK.
- Classic fun.

Enjoy

Regardless of whether you decide to improve the number of games by developing your own or not, you have to agree that, in the end, all the Atari Arcade represents is a more simpler era of gaming, and in some circumstances, a more civilised generation of game.

Ever since Ralph Baer and Bill Harrison got together and made the Brown Box, it's the classic games that have stood the test of time and are as easily recognised as some of the big budget releases of the last decade or so. So, come rain or shine (but probably rain), why not spend a few moments and reminisce with a bit of Atari classic gaming?

Loads of really cool classics to get into at the Atari Arcade

Classic gnome-powered destruction

We still lose, considerably so

Logging Off

After some initial rubber-necking from the mainstream media, the Ashley Madison story has all but faded away, pidgeon-holed with all those other companies who couldn't find their firewalls with both hands and people who have confidence in people they've never met in a business located in a remote land.

Yet I predict we've not heard the last of Ashley Madison, because what is in the data that was stolen from it is disturbing on more levels purely than the martial fidelity one.

I need to say at this point that I don't have this data, because it was acquired illegally, and therefore downloading it would also be breaking the law.

But there are people much more cavalier than me, and what they've said about the user database and associated management emails throws what this operation was really about into question.

For starters, there are 37 million user accounts, 12 million of which were female and 25 million were male. That ratio isn't very surprising considering that most of Ashley Madison's marketing is very focused on men, but those women who use the site obviously have a wider choice of potential partners.

But deeper investigation reveals that there are in fact only about 12,000 active accounts attributed to women, and about 5.5 million have been created and then never used again. That puts the bias on the men/women ratio right into the stratosphere, so what's really going on here?

For those, including me, I might add, who have never been on this site, Ashley Madison made money by charging you small amounts to email other members, who you hope to start a relationship with. But, as a man, you've only really got a 1/458 chance of actually sending an email to someone who exists.

Some people initially thought that the 5.5 million unused accounts got made by real women who then had second thoughts afterwards, for whatever reason. But along with the database data, lots of internal emails reveal that most of these accounts never belonged to real people at any point.

The company behind Ashley Madison, Avid Life Media, created many of them, and it also sub-contracted the process of crafting imaginary users to outside companies.

This goes some way toward explaining how some women have been shocked to discover that they're listed on Ashley Madison when they've never been near the site.

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Internally, these fake accounts were called 'angels', and they spent many millions of dollars to create entirely fictitious accounts, so men could pay money to email them in the wild hope of something extramarital happening.

So how successful was this business in suckering men into paying to get automated responses? In its accounts filing for 2014, it declared revenue of $115.5 million.

As has been pointed out by others, there are only a couple of ways to view all this activity, and the really obvious one is fraud. The other, for those being exceptionally generous, was that the business was set up to offer what it pertains, and then it couldn't attract any women, so it resorted to faking them in desperation. Whatever the history, the truth is most certainly out there now.

Being a connoisseur of fine irony, that people wanting to cheat on others were conned by a company cheating them is something quite majestic.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: **7** Parallelogram, **8** Redtop, **9** Modify, **10** Library, **12** Trait, **14** Offer, **16** Sampler, **19** Active, **20** Target, **22** Constellation.
Down: **1** Date, **2** Maxtor, **3** Clipart, **4** Flame, **5** Agadir, **6** Half-Life, **11** Infector, **13** Tactile, **15** Eo Ipso, **17** Parity, **18** Meter, **21** EPOS.

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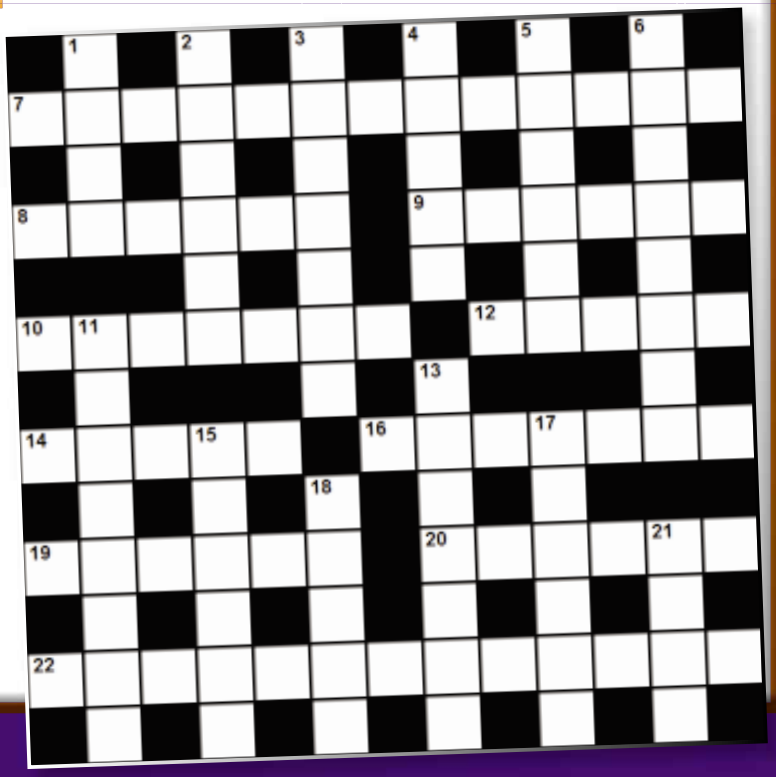
You know your diet needs work when you can't remember the last time you ate a vegetable (other than fried potatoes). Shamefully, we experienced this very problem this week, because we've had a pretty full schedule, so we've had little time to make sure we weren't just eating junk (which we were). By the end of the week, our body was screaming out for something green and leafy, and we made what is a someone strange decision for us: we decided to have a salad. You know, with lettuce and stuff. It's not our favourite thing, but the good news is you can cover it in salad dressing and make it taste like something else. And when you've put a big pile of coleslaw next to it (more vegetables there, we might add), some ham, a few boiled eggs, some cheddar and a huge chunk of crusty white bread, it actually starts to look something like real food. The best thing, though, is that you've satisfied your salad quota for the month, and you can get back to eating rubbish again. Yay!

THIS WEEK'S CROSSWORD

Across
7 Someone who undertakes illegal activities by means of computers or the internet. (13)
8 Used before a numeral to denote a setting on a temperature scale in a gas oven. (6)
9 The F14 jet fighter used by the United States Navy (and Tom Cruise?) from 1974 to 2006. (6)
10 Classic strategy game, also known as Reversi. (7)
12 Popular file transfer application from Ipswitch. (5)
14 The adult leader of a group of cub scouts. (5)
16 Equality of distribution. (7)
19 Severe hypoxia. (6)
20 Sign or give formal consent to a contract or agreement thus making it officially valid. (6)
22 Devices for making a record of the wave forms of fluctuating voltages or currents. (13)

Down
1 A harp used by ancient Greeks for accompaniment. (4)
2 Conclude by logical reasoning. (6)
3 One of the United Kingdom's largest retail chains of mass-market computer superstores. (2,5)
4 Small pieces of practical information or advice. (5)
5 A colouring material obtained from lichens that turns red in acid solutions and blue in alkaline solutions. (6)
6 Virgin's space program. (8)
11 The practice of making only a perfunctory or symbolic effort to do a particular thing, especially by recruiting a small number of people from under-represented groups. (8)
13 An extensible open-source platform for constructing enterprise-class RDBMS services. (7)
15 Three more than 70. (6)
17 Existing in fact. (6)
18 Sister to Agnus and Denise of the Amiga family? (5)
21 A warm dry wind that blows down the northern slopes of the Alps. (4)



In Next Week's Micro Mart*

- How well has Windows 10 really done so far?
- Can YouTube Gaming really make an impact?
- Examining the Google OnHub router
- Plus the usual mix of news, reviews and advice

* May be subject to change

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AMD RADEON GRAPHICS

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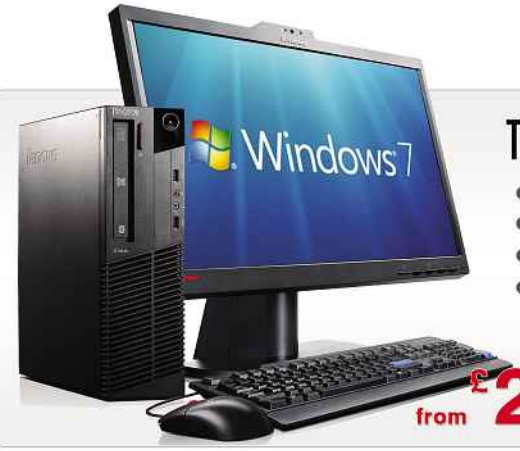

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